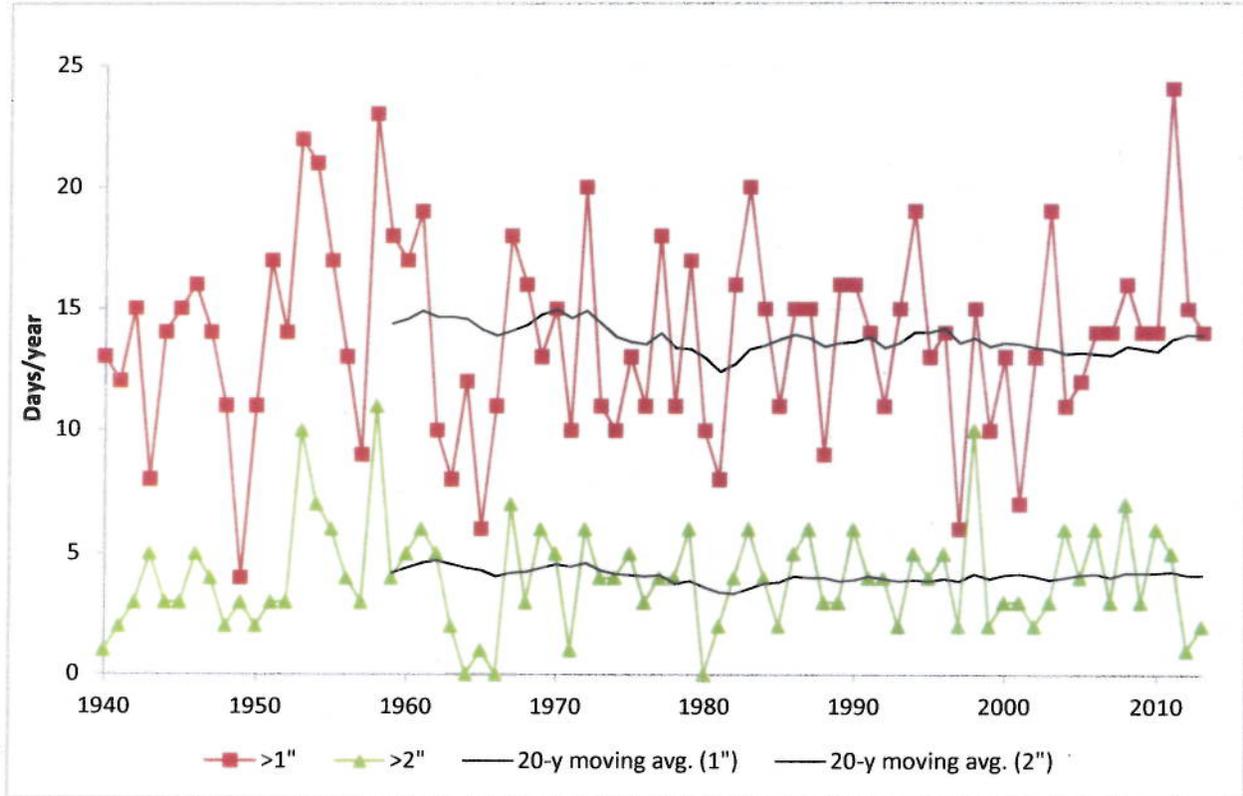


As CSO is driven by large rain events, the incidence of days with precipitation exceeding one inch and two inches is presented in Figure 2. Only Boston data are presented, as it has the most reliable long-term record, and is reasonably representative of, although slightly drier than, Lowell. The figure shows that the number of days per year with at least one inch of precipitation has remained near 14 since 1940, while the number of days per year with at least two inches has remained near four.

Figure 2 Days per Year with Rain above Thresholds



These data collectively indicate that modest long-term trends in annual precipitation in the region exist, with recent decades somewhat wetter than average.

C.3 Representative Period Selection

The 1969-1973 Boston hourly data used in prior Lowell CSO facilities planning averaged 44.3 inches of precipitation annually. Candidate representative periods for the updated analyses were screened according to the following criteria:

- a five year period since 1973 with at least 44 inches average annual precipitation
- years with storms with average recurrence intervals (ARIs) greater than 10 years are less preferable
- the number of three-month through five-year events at durations from 1 to 24 hours should be close to the long-term expected values

Table 2 lists events in the Boston hourly record since 1949 where ARI exceeds 10 years at durations from one to 24 hours. Since 1980, only 1999 through 2005 have no 10-year events over any 5-year interval.

Periods including the years 1985, 1998, and 1999 were excluded from consideration due to the very large single storms in each of these years, while all other years were considered viable candidates.

Table 2 10-year Events in Boston Hourly Precipitation Record

Date	ARI (years) at duration (hours)					
	1	2	3	6	12	24
September 1, 1949	20					
August 5, 1952	25					
May 16, 1954		10	15	35	45	25
September 11, 1954		10	15	40	45	20
July 10, 1955	20	20	15			
August 19, 1955	10	40	65	85	85	100
June 4, 1960	20					
August 6, 1967	20	25	15			
August 1, 1985	65	65	60	35	20	
October 14, 1990				20		
November 23, 1992				15		
December 11, 1992						15
October 20, 1996					20	25
June 13, 1998			35	25	30	25
September 10, 1999		15	15	25	20	10
May 13, 2006						10
July 28, 2007		10				
July 30, 2007	20					
July 10, 2010	15					

Since 1973, Boston's average annual precipitation averaged 44 inches or more in the five-year periods ending 1985, 1986, 1987, 1994, and each year since 2008. As 1985 includes an extremely large event, the candidate period list was shortened to be 1990-1994 and each of the five year periods from 2004-2008 through 2008-2012.

Table 3 lists the number of 1-year events in each candidate period for 1-hour through 24-hour durations. The ideal 5-year period would have five 1-year events at each duration. The period 2005-2009 has the least deviation from this ideal, with between four and six events at each duration.

Table 3 1-year Events during Candidate Periods

Start	End	Number of 1-y events at duration (h)					
		1	2	3	6	12	24
1969	1973	4	2	4	7	6	6
1990	1994	5	5	5	7	9	8
2004	2008	4	6	6	6	6	8
2005	2009	4	5	5	5	4	6
2006	2010	7	7	7	6	4	8
2007	2011	8	7	8	6	3	6
2008	2012	7	6	7	5	3	6

The period 2005-2009 was further screened to assess the number of 3-month through 5-year events, as presented in Table 4.

Table 4 Number of Events Exceeding Specified ARIs at Select Durations, 2005-2009

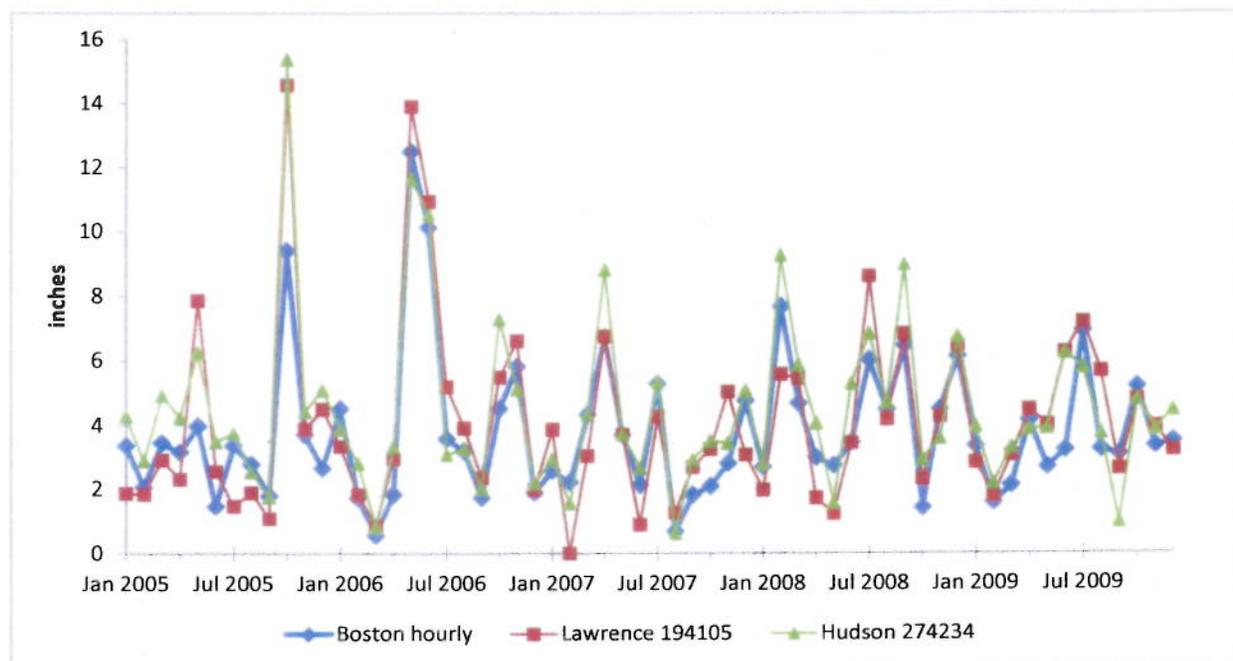
ARI	Number of events at duration (h)						Ideal
	1	2	3	6	12	24	
3-month	22	22	21	18	20	25	20
6-month	8	11	9	9	10	11	10
1-year	4	5	5	5	4	6	5
2-year	3	2	2	1	3	3	2.5
5-year	2	2	1	0	0	1	1

Table 4 shows, for instance, that there were 10 6-month, 12-hour rainfall events in Boston from 2005-2009, perfectly matching the expected value of 10, while there were three 2-year, 24-hour events, close to the expected value of 2.5.

These analyses indicate that 2005-2009 provides a good basis for representative period simulation. While 2005-2009 is chosen to be representative of long-term conditions in Lowell, and not necessarily matched to actual weather there during that period, Table 5 shows that annual precipitation among Boston (hourly dataset), Lawrence, and Hudson (the Lowell COOP record is not shown here due to its flaws) is comparable among the three stations, although Boston generally lags the other locations. Figure 3 shows monthly precipitation at these locations over the five years. Boston slightly trails Lawrence and Hudson much of the time, with a large gap in October 2005, when remnants of two tropical storms produced extreme rainfall across much of New England. However, its overall pattern of precipitation closely resembles that observed in the Lowell area.

Table 5 Annual Precipitation 2005-2009

Year	Boston	Lawrence	Hudson
2005	41.2	46.8	59.1
2006	51.9	59.3	56.0
2007	39.0	37.8	44.9
2008	53.1	52.0	62.5
2009	42.3	49.8	47.1
Average	45.5	49.1	53.9

Figure 3 2005-2009 Monthly Precipitation

It is preferable to use data with the same time step for model calibration and system assessment simulations. As the model is calibrated to 15-minute data obtained during the 2012 flow monitoring program, the Boston hourly record was synthetically disaggregated to 15-minute intervals using an algorithm in CDM Smith's NetSTORM software.

In summary, while Logan Airport precipitation is less than in the Lowell area, the overall pattern of storms in Boston is comparable with Lowell, and Logan has the most reliable long-term data in the region. A consecutive five-year period from 2005-2009 for Boston was used for Lowell long-term simulations. The selected period is wetter than average for Boston, but close to average conditions for Lowell.

C.4 Design Storms

Design storms for this Lowell CSO facilities planning study are primarily used for preliminary purposes. Design storms are used to screen alternatives, while long-term simulations are used to

confirm system performance. For example, 1-year performance of the system can be initially assessed using a design storm, but confirmation of a design is achieved through demonstrating less than five events over the five-year simulation. As the design storms are of limited importance for this study, and the storms used in prior studies were found to be reasonably adequate, no changes were made to the suite of events. Those events and the associated rainfall statistics are presented below.

CSO planning studies for Lowell, Lawrence, and Haverhill have used the same suite of design storms since the 1990s. Hourly hyetographs for these storms are from the historic record at Logan Airport; 15-minute data are synthesized using NetSTORM. Depths at selected durations for the hourly data are presented in Table 6.

Table 6 Lowell Design Storm Depths

Date	ARI	Depth (inches) at duration (hours)					
		1	2	3	6	12	24
May 1, 1953	3 month	0.46	0.74	0.96	1.26	1.41	1.51
Aug 19, 1991	6 month	0.59	0.73	0.94	1.34	2.06	2.21
Sep 20, 1961	1 year	0.65	1.10	1.38	1.75	2.23	2.79
Sep 25, 1961	2 year	0.95	1.43	1.59	1.84	2.38	3.08
Aug 18, 1955	5-10 year	1.20	1.98	2.07	2.52	4.48	4.88

The storms were selected so that each larger event exceeds the previous event at most durations. The exception to this is that the 6-month event is smaller than the 3-month event at 2-hour and 3-hour durations. As the storms were selected from historic data, they do not match individual recurrence interval depths at each duration. This is because, in New England, short duration rainfall maxima are generally driven by short-duration events such as frontal thunderstorms, while long duration maxima are driven by both frontal storms as well as widespread cyclonic events such as tropical storms and nor'easters. The historic storm hyetographs thus do not have ARIs that correspond with regional frequency statistics at any particular duration. This differs considerably from the NRCS design storms used in many applications. Those hyetographs are synthetic events that effectively nest an N-year 1-hour event within an N-year 24-hour event even though the resultant hyetograph effectively has a considerably higher ARI when joint probabilities are considered.

Table 7 presents rainfall frequency statistics for Lowell, based on regional analysis performed by Cornell University combined with CDM Smith's analysis of local data.

Table 7 Lowell Rainfall Frequency Statistics

	3 mo	6 mo	1 yr	2 yr	5 yr	10 yr
15 min	0.31	0.39	0.52	0.64	0.76	0.87
30 min	0.40	0.51	0.70	0.87	1.05	1.22
1 hour	0.54	0.66	0.86	1.07	1.33	1.58
2 hour	0.66	0.83	1.05	1.26	1.58	1.87
3 hour	0.81	1.02	1.20	1.44	1.80	2.12
6 hour	1.13	1.42	1.57	1.89	2.33	2.72
12hr	1.47	1.83	2.02	2.42	2.95	3.43
24hr	1.73	2.17	2.55	3.06	3.87	4.63
48 hr	1.89	2.43	2.77	3.37	4.29	5.15

Source: Cornell Northeast Regional Climate Center for 1-year and longer ARIs; CDM Smith analysis of Logan Airport data for 3-month and 6-month ARIs

The storm depths presented in Table 6 may be assessed based on the frequency statistics in Table 7 to assign ARIs to each of the design storms at each duration. Table 8 presents such an analysis, although the recurrence intervals are based exclusively on the NetSTORM analyses to facilitate consistency. The values thus do not exactly match results interpolated from Table 7.

Table 8 Lowell Design Storm Recurrence Intervals

Date	ARI	ARI (years) at duration (hours)					
		1	2	3	6	12	24
May 1, 1953	3 month	0.27	0.33	0.41	0.35	0.22	0.19
Aug 19, 1991	6 month	0.54	0.32	0.38	0.44	0.73	0.53
Sep 20, 1961	1 year	0.7	1.3	1.5	1.2	1.0	1.2
Sep 25, 1961	2 year	2.0	3.2	2.6	1.4	1.3	1.7
Aug 18, 1955	5-10 year	11	15	8	7	26	14

Table 8 shows, for example, that the 3-month storm is close to, or exceeds a 3-month depth at durations from 1 to 6 hours, but is slightly smaller (a 0.2-year event) at 12 and 24 hours. Conversely, the 1-year storm is smaller than a 1-year event at a 1-hour duration, but meets or exceeds a 1-year depth at durations from two to 24 hours. Additionally, it shows that the August 1955 storm exceeds a 5-year ARI at most intervals. This storm was the initial part of Hurricane Diane. Rainfall on the following day was a 100-year event at most durations, and remains the largest storm on record across much of New England. The 2-year event was associated with tropical storm Esther.

Sub-hourly data for events at Logan Airport are available for some larger events before 2000, and for many events from the ASOS data over the last decade. Short-duration maxima for the design storms presented here have not been researched.

These design storms are intended to estimate CSO at the identified storm frequency; designs can then be refined using long-term simulation. These storms are not intended for use in local drainage design where conveyance, not volume is the principal concern. For drainage design in small basins, traditional methods such as NRCS hyetographs are appropriate to use. Such results could similarly be

confirmed through long-term simulation, although a longer simulation period or alternative methods would be appropriate, as drainage designs typically are intended to meet 10-year or longer level of service, which can not be readily assessed from simulation of a five-year representative period.

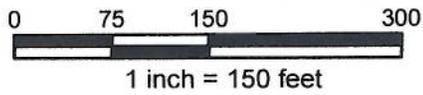
Appendix D

Preliminary Evaluation of CSO Abatement Sites



Legend

-  2013 LTCP Sites
- 00** LTCP Site ID
-  Sewer Interceptor
-  Sewer Siphon



Lowell, MA Sewer System
Satellite Site 2013 LTCP

November, 2013

**Site
1**

**Site No. 1-Walker CSO Station
Pawtucket Street and Walker Street**

Location

The site is located on the south bank of the Merrimack River in John E. Sheehy Memorial Park in The Acre neighborhood of Lowell. The site is bounded by Pawtucket Street to the south, the Lowell Motor Boat Club to the east, and the Merrimack River to the north. The Walker Interceptor and the Walker CSO Station are located within the site.

Ownership

The site consists of one parcel owned by the City of Lowell. [GIS ID 4550-501, Book 203788]

Area

According to the City of Lowell assessor's map, the site has a land area of 5.42 acres.

Elevation

Based on City of Lowell topographic mapping, the site is relatively flat with elevations ranging from 94 to 104 feet. The average site elevation is approximately 98 feet. (NAVD 88).

Site Access and Traffic

The site is accessible from Pawtucket Street to the south. Pawtucket Street has relatively high traffic volume, especially at the School Street and Pawtucket Street intersection, but should be able to accommodate construction traffic. Minor traffic delays might occur during high volume traffic periods of the day.

Current Land Use

The site is a grassy park (Sheehy Park-riverfront park) that abuts the Merrimack River to the north. The site serves as a passive recreational area, and a parking lot. The Walker CSO Station is located on the north-central portion of the site.

Site Zoning

The site is zoned INST Institutional Mixed-Use District. According to the zoning regulations, utilities and public service uses are permitted in this district as a special exception only if the board of appeals determines and grants a special permit therefor as provided in Section 11-3, Appendix A-Zoning, of the Lowell Zoning Ordinance.

Surrounding Land Use/Zoning

The site and adjacent land to the south, east and west are all part of the same INST Institutional Mixed-Use District. The site is bound to the north by the Merrimack River. The Lowell Motor Boat Club is located directly east of the site. A parking lot, residential properties and commercial properties comprise the neighborhood to the south.

Environment

There are wetlands on the site along the bank, which abuts the Merrimack River to the north, and a portion of the site is within the 25-foot Riverfront Area and the 100-foot Buffer Zone to Bank.

According to the USDA Web Soil Survey, the soils on the site consist of the following: 655-Udorthents, wet substratum and 626B-Merrimac-Urban land Complex, 0 to 8 percent slopes.

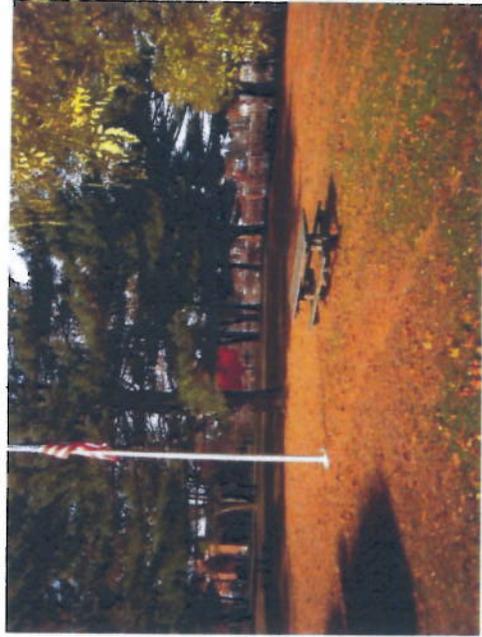
According to the Lowell Flood Insurance Rate Maps, a majority of the site is located within the 100-year flood zone.

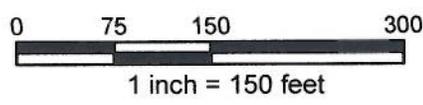
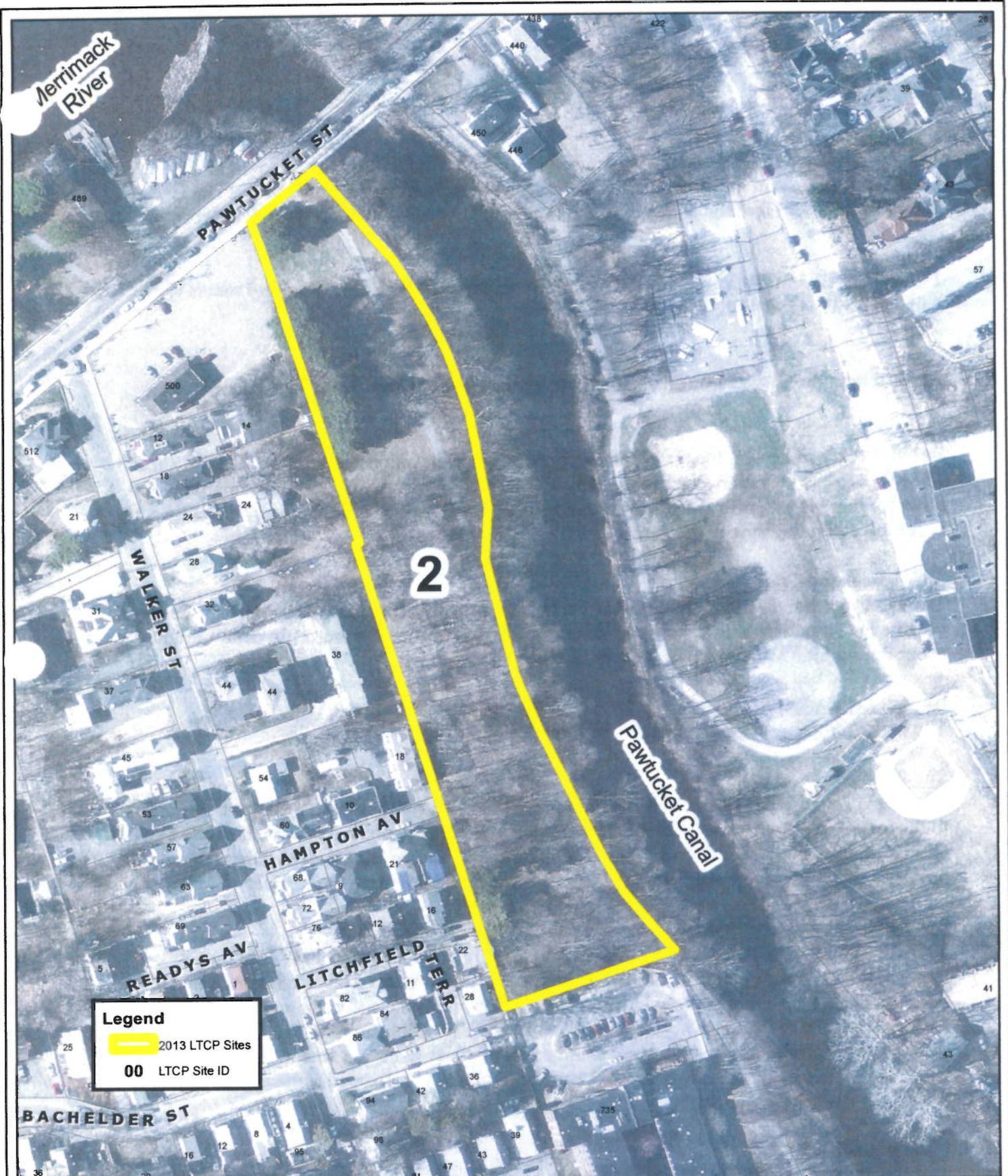
The CSO site is located south of the Merrimack River, which is listed as an Estimated Habitat (EH 65) and a Priority Habitat (PH 1321) as indicated by the 2008 Priority and Estimated Habitat layers created by NHESP.

Historic Features

A review of the State Register of Historic Places and the Inventory of Historic and Archaeological Assets of the Commonwealth of the Massachusetts located at the Massachusetts Historical Commission did not identify any known historical structures or archaeological sites within the CSO site. The site falls within the Lowell National Historical Park & Preservation District.

Site 1





Lowell, MA Sewer System
Satellite Site 2013 LTCP

November, 2013

**Site
2**

Site No. 2-Walker CSO Station Pawtucket Street and Pawtucket Canal

Location

The site, known as Francis Gate Park/Lowell Heritage State Park, is located south of the Merrimack River and Pawtucket Street in The Acre neighborhood of Lowell. The site is approximately 500 feet south east from the Walker CSO Station and the Walker Interceptor.

Ownership

The site consists of one parcel owned by the Commonwealth of Massachusetts-Francis Gate Park. [GIS ID 4550-480, Book 2285, Page 658].

Area

According to the City of Lowell assessor's map, the site has a land area of 3.44 acres.

Elevation

Based on City of Lowell topographic mapping, the site's elevations range from 92 to 112 feet. The average site elevation is approximately 103 feet. The majority of the site is relatively flat, however there is a significant rise in elevation in the south west corner and approximately a 10 foot drop along the bank of the canal. (NAVD 88).

Site Access and Traffic

The site is accessible from Pawtucket Street to the north. The road has relatively high traffic volume but should be able to accommodate construction traffic. Minor traffic delays might occur during high volume traffic periods of the day.

Current Land Use

The park consists of a grassy open lot with scattered trees.

Site Zoning

The site is zoned TMF Traditional Neighborhood Multi-Family Residential District. According to the zoning regulations, utilities and public service uses are permitted in these districts as a special exception only if the board of appeals determines and grants a special permit therefor as provided in Section 11-3, Appendix A-Zoning, of the Lowell Zoning Ordinance.

Surrounding Land Use/Zoning

The site and adjacent land to the south and west are all part of the same TMF Traditional Neighborhood Multi-Family Residential District. North and west of the site is zoned INST Institutional Mixed-Use District. The Pawtucket Canal abuts the site to the east. Across Pawtucket Street to the northwest is the Lowell Motor Boat Club and Site No. 1. A parking lot, residential properties and an ice-cream commercial property abuts the northwest corner of the site. The Francis Gatehouse Mill (Lowell Housing Authority) is located south of Pawtucket Street and east of Walker Street.

Environment

The site abuts the Pawtucket Canal to the east. A sliver of land directly abutting the canal is considered within a wetland. The site is also partially within the 25-foot Riverfront Area and the 100-foot Buffer Zone to Bank.

According to the USDA Web Soil Survey, the soils on the site consist of 626B-Merrimac-Urban land complex, 0 to 8 percent slopes.

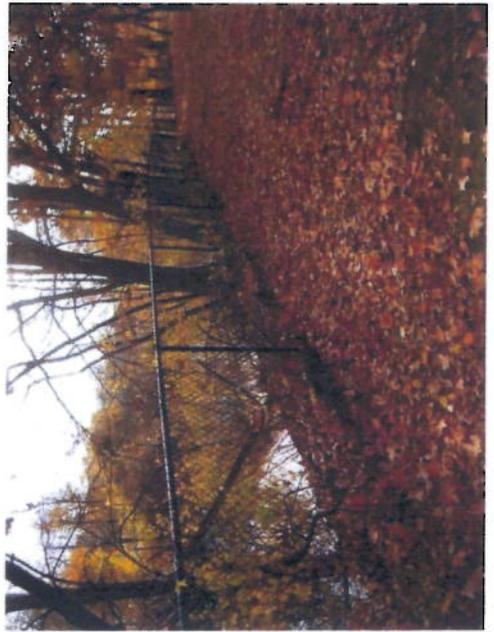
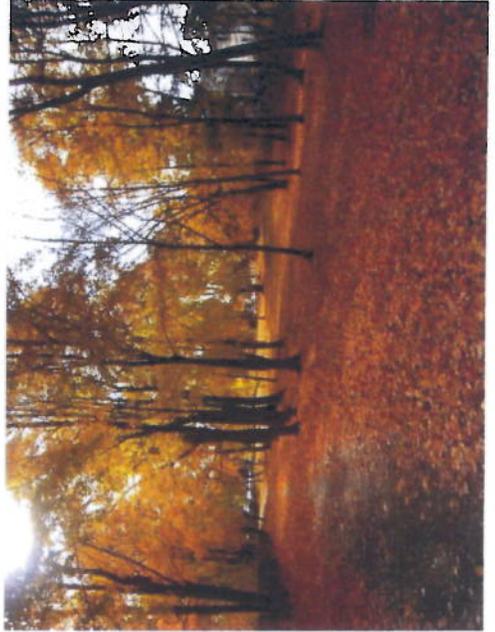
According to the Lowell Flood Insurance Rate Maps, a narrow portion of the site is located within the 100-year flood zone.

There are no Estimated Habitats or Priority Habitats of rare species within this site as indicated by the 2008 Priority and Estimated Habitat layers created by NHESP.

Historic Features

A review of the State Register of Historic Places and the Inventory of Historic and Archaeological Assets of the Commonwealth of the Massachusetts located at the Massachusetts Historical Commission did not identify any known historical structures on the site or archaeological sites within the CSO site. The CSO site falls within the Lowell National Historical Park & Preservation District, and the Downtown Lowell Historical District.

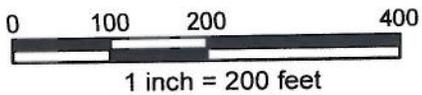
Site 2





Legend

- 2013 LTCP Sites
- 00** LTCP Site ID



Lowell, MA Sewer System
Satellite Site 2013 LTCP

November, 2013

**Site
3**

**Site No. 3-Walker CSO Station
Pawtucket Street and Pawtucket Canal**

Location

The site is located on the south of the Merrimack River and Pawtucket Street in The Acre neighborhood of Lowell. The site is bounded to the west by the Pawtucket Canal, and the Bartlett Community Partnership School to the east. Pawtucket Street binds the site to the north. The site is approximately 1000 feet south east from the Walker CSO Station and the Walker Interceptor.

Ownership

The site consists of two parcels owned by the City of Lowell – School Department. [GIS ID 4550-490, Book 940, page 14 and Book 2285, page 658]

Area

According to the City of Lowell assessor's map, the site has a land area of 9.40 acres.

Elevation

Based on City of Lowell topographic mapping, the site's elevations range from 98 to 144 feet. The average site elevation is approximately 108 feet. The site is generally higher near the access road, but contains a significantly flat area near the canal. (NAVD 88).

Site Access and Traffic

The site is accessible from a driveway on Pawtucket Street to the north, between Wannalancit Street and the Pawtucket Canal. Pawtucket Street has relatively high traffic volume but should be able to accommodate construction traffic. Minor traffic delays might occur during high volume traffic periods of the day.

Current Land Use

The site consists of multiple baseball and athletic fields, tennis and basketball courts, and a skate park.

Site Zoning

The site is zoned TSF Traditional Neighborhood Single Family Residential District. According to the zoning regulations, utilities and public service uses are permitted in these districts as a special exception only if the board of appeals determines and grants a special permit therefor as provided in Section 11-3, Appendix A-Zoning, of the Lowell Zoning Ordinance.

Surrounding Land Use/Zoning

The site and adjacent parcels to the west are all part of the same TSF Traditional Neighborhood Single Family Residential District. Parcels to the south-west of the site are TTF Traditional Neighborhood Two Family Residential District, and the parcels to the north and south are TMF Traditional Multi-Family Residential District. The Pawtucket Canal binds the east side of the site.

Environment

The site abuts the Pawtucket Canal to the east. A narrow portion of land directly abutting the river is considered within a wetland. The site is also partially within both the 25-foot Riverfront Area and the 100-foot Buffer Zone to Bank.

According to the USDA Web Soil Survey, the soils on the site consist of the following: 654-Udorthents, loamy and 626B-Merrimac-Urban Land complex, 0 to 8 percent slopes.

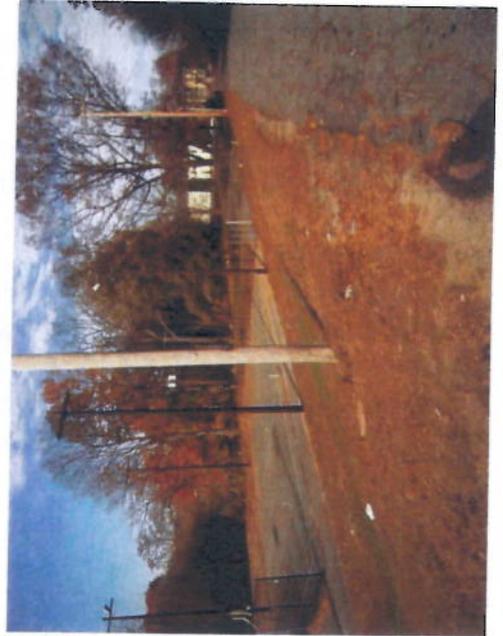
According to the Lowell Flood Insurance Rate Maps, a small sliver of the site along the Pawtucket Canal may be located within the 100-year flood zone.

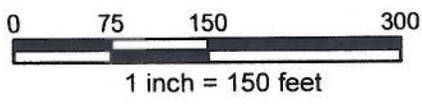
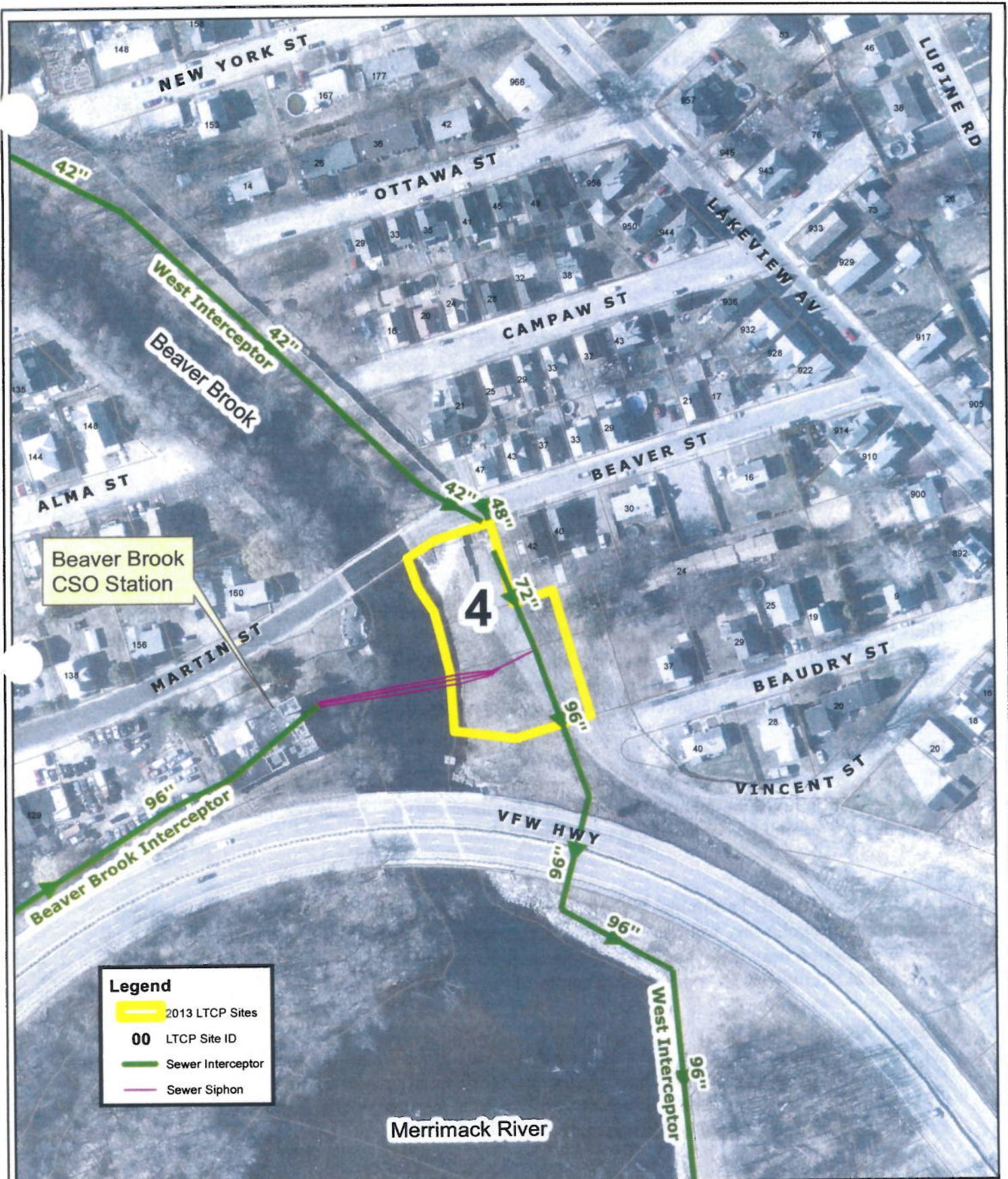
There are no Estimated Habitats or Priority Habitats of rare species within this site as indicated by the 2008 Priority and Estimated Habitat layers created by NHESP.

Historic Features

A review of the State Register of Historic Places and the Inventory of Historic and Archaeological Assets of the Commonwealth of the Massachusetts located at the Massachusetts Historical Commission did not identify any known historical structures on the site or archaeological sites within the CSO site. The site falls within the Lowell National Historical Park & Preservation District, and the Downtown Lowell Historical District.

Site 3





Lowell, MA Sewer System
Satellite Site 2013 LTCP

November, 2013

**Site
4**

Site No. 4-Beaver Brook CSO Station South of Beaver Street at Beaver Brook

Location

The site is located north of the Merrimack River along Beaver Brook in the Centralville neighborhood of Lowell. The site is bound to the north by Beaver Street, to the south by VFW Highway, to the west by Beaver Brook and by residential properties to the east. The site is directly east, across the brook, from the Beaver Brook CSO station (150 feet away). The West Interceptor is located within the site.

Ownership

The site consists of three parcels of land owned by the City of Lowell. [GIS ID 0455-55, Book 944, Page 69; GIS ID 0465-50, Page 191; GIS ID 0465-54, Book 964, Page 272].

Area

According to the City of Lowell assessor's map, the site has a land area of 0.70 acres.

Elevation

Based on City of Lowell topographic mapping the site elevation ranges from 56 to 74 feet. The average site elevation is approximately 70 feet. (NAVD 88).

Site Access and Traffic

The site is accessible from the west by Martin Street near Beaver Brook or from the east by Beaver Street and Beaudry Street. Both Martin Street and Beaver Street are moderately traveled residential roads. Beaudry Street is a dead end street which ends near the site's eastern boundary. All three roads should be able to accommodate construction traffic. Minor traffic delays might occur during high volume traffic periods of the day on Martin and Beaver Streets.

Current Land Use

The site is an open area comprised of grass and trees with a stabilized slope which is part of the flood protection levee on the north bank of the Merrimack River. However, because of the levee this site cannot be considered for satellite facilities.

Site Zoning

The site is zoned TSF Traditional Neighborhood Single Family Residential District. According to the zoning regulations, utilities and public service uses are permitted in these districts as a special exception only if the board of appeals determines and grants a special permit therefor as provided in Section 11-3, Appendix A-Zoning, of the Lowell Zoning Ordinance.

Surrounding Land Use

The site and adjacent parcels to the north, south and east all lie within the same TSF Traditional Neighborhood Single Family Residential District. Residential properties are directly north and east of the site. West of the site, across Beaver Brook, is the Beaver Brook pump station south of Martin Street and residential properties north of Martin Street.

Environment

There are wetlands on the site along the bank which abuts the Beaver Brook to the west. The site is also within the 100-foot Buffer Zone and may be within the 25-foot Riverfront Area.

According to the USDA Web Soil Survey, the soils on the site consist of 626B-Merrimac-Urban land complex, 0 to 8 percent slope.

According to the Lowell Flood Insurance Rate Maps, a majority of the site is located within the 100-year flood zone.

There are no Estimated Habitats or Priority Habitats of rare species within this site as indicated by the 2008 Priority and Estimated Habitat layers created by NHESP. However, the site is located north the Merrimack River which is listed as an Estimated Habitat (WH 65) and a Priority Habitat (PH 1321).

Historic Features

A review of the State Register of Historic Places and the Inventory of Historic and Archaeological Assets of the Commonwealth of the Massachusetts located at the Massachusetts Historical Commission indicates there is a historic feature No. 995 (Low.995), the VFW Highway Bridge over Beaver Brook, located west of the site. There weren't any known archaeological sites identified within the CSO site. The site does not appear to fall within a historic district.

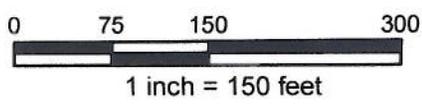
Site 4





Legend

-  2013 LTCP Sites
- 00** LTCP Site ID
-  Sewer Interceptor



Lowell, MA Sewer System
Satellite Site 2013 LTCP

November, 2013

**Site
5**

**Site No. 5-Beaver Brook CSO Station
Across from Site No. 6 (VFW Highway)**

Location

The site is located along the north bank of the Merrimack River in the Centralville neighborhood of Lowell. The site is bounded by the VFW Highway to the north east, the Aiken Street Bridge to the southeast, and the Merrimack River to the south and west. The West CSO Station is located approximately 1,600 feet south east of the site and the Beaver Brook CSO Station is located approximately 700 feet north west from the site. The West Interceptor is within the site.

Ownership

The site consists of two parcels owned by the City of Lowell. [GIS ID 0070-644; GIS ID 0070-650].

Area

According to the City of Lowell assessor's map, the site has a land area of 5.39 acres.

Elevation

Based on City of Lowell topographic mapping, the site elevation ranges from 56 to 78 feet. The average site elevation is approximately 74 feet. The elevations on portions of this site are relatively steep. (NAVD 88).

Site Access and Traffic

The site is accessible from access roads off VFW Highway. The highway can experience moderate to heavy traffic volume during the high volume traffic period of the day but should be able to accommodate construction traffic without significant delays.

Current Land Use

The site is a narrow, densely vegetated/wooded vacant lot. A paved walking path with a wooden guard rail is located at the river's edge. A radio tower is located on a small portion of the site.

Site Zoning

The site is zoned TSF Traditional Neighborhood Single Family Residential District. According to the zoning regulations, utilities and public service uses are permitted in this district as a special exception only if the board of appeals determines and grants a special permit therefor as provided in Section 11-3, Appendix A-Zoning, of the Lowell Zoning Ordinance.

Surrounding Land Use/Zoning

The site is bounded by the VFW Highway to the north and east, and Aiken Street and the Aiken Street Bridge to the south. The Merrimack River abuts the site to the south and west. Across the VFW Highway to the northeast is Site No.6 which is an open parcel comprised of a football field, basketball courts, tennis courts and baseball fields. There are no residential or commercial properties in the immediate vicinity of the site.

Environment

There are wetlands on the site along the river bank. The site is also within the 25-foot Riverfront Area and the 100-foot Buffer Zone to Bank.

According to the USDA Web Soil Survey, the soils on the site consist of the following: 653-Udorthents, sandy.

According to the Lowell Flood Insurance Rate Maps, a portion of the site along the Merrimack River is located within the 100-year flood zone.

The CSO abuts the Merrimack River which is listed as an Estimated Habitat (WH 65) and a Priority Habitat (PH 1321) as indicated by the 2008 Priority and Estimated Habitat layers created by NHESP.

Historic Features

A review of the State Register of Historic Places and the Inventory of Historic and Archaeological Assets of the Commonwealth of the Massachusetts located at the Massachusetts Historical Commission did not identify any known historical structures on the site, but the Aiken Street Bridge which abuts the site to the south is a historic feature (Low.901). There weren't any known archaeological sites identified within the CSO site. The site falls within the Lowell National Historical Park & Preservation District.

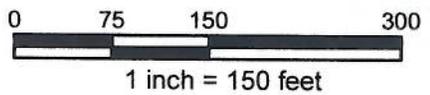
Site 5





Legend

- 2013 LTCP Sites
- 00** LTCP Site ID
- Sewer Interceptor



Lowell, MA Sewer System
Satellite Site 2013 LTCP

November, 2013

Site
6, 7A&7B

**Site No. 6-Beaver Brook CSO Station
Between VFW Highway and W. Sixth Street**

Location

The site, known as St. Louis Park, is located on the north bank of the Merrimack River in the Centralville neighborhood of Lowell. The site is located at the northeast side of the VFW Highway. The site is bounded by the VFW Highway to the west and south, residential and commercial areas to the north, and Toni's Restaurant to the southeast. The site is located approximately 800 feet southeast from the Beaver Brook CSO Station and approximately 300 feet north east of the West Interceptor.

Ownership

The site consists of two parcels owned by the City of Lowell. [GIS ID 3185-29; GIS ID 6040-406, Book 940, Page 14].

Area

According to the City of Lowell assessor's map, the site has a land area of 5.88 acres.

Elevation

Based on City of Lowell topographic mapping, the site is flat with elevations ranging from 72 to 76 feet. The average site elevation is approximately 74 feet. (NAVD 88).

Site Access and Traffic

The site is accessible from the VFW Highway west of the site into the parking lot on the southern portion of the site. The highway can experience moderate to heavy traffic volume during the high volume traffic period of the day but should be able accommodate construction traffic without significant traffic delays. The site is also accessible from West Sixth Street located adjacent to the north side of the site. West Sixth Street is a moderately traveled residential road with some commercial use and should be able to accommodate construction traffic. Minor traffic delays might occur during high volume traffic periods of the day.

Current Land Use

The majority of the site is an open parcel comprised of a football field, tennis courts and baseball fields. A smaller portion located on the south side of the parcel is a parking lot that was not occupied at the time of the site visit.

Site Zoning

The site is zoned TSF Traditional Neighborhood Single Family Residential District. According to the zoning regulations, utilities and public service uses are permitted in this district as a special exception only if the board of appeals determines and grants a special permit therefor as provided in Section 11-3, Appendix A-Zoning, of the Lowell Zoning Ordinance.

Surrounding Land Use/Zoning

The site and adjacent land to the north east of the site are all part of the same TSF Traditional Neighborhood Single Family Residential District. Parcels to the east of the site are zoned NB Neighborhood Business District. Parcels to the south are zoned UMU Urban Mixed-Use District. The VFW Highway is located west of the site. Residential properties and ACE Home Center abut the property to the north on West Sixth Street and Toni's Restaurant is east of the site. A vacant building east of the playground was observed during the site visit.

Environment

Wetlands were not observed on, or adjacent to the site. The site is not located within the 100-foot Buffer Zone or the 25-foot Riverfront Area.

According to the USDA Web Soil Survey, the soils on the site consist of 653-Udorthents, sandy.

According to the Lowell Flood Insurance Rate Maps, the site is not located within the 100-year flood zone.

There are no listed Estimated Habitats and Priority Habitats of rare species within the site as indicated by the 2008 Priority and Estimated Habitat layers created by NHESP.

Historic Features

A review of the State Register of Historic Places and the Inventory of Historic and Archaeological Assets of the Commonwealth of the Massachusetts located at the Massachusetts Historical Commission did not identify any known historical structures or archaeological sites within the CSO site. There are no known archaeological sites within the CSO site. The site does not appear to fall within a historic district.

Site 6



**Site No. 7A-Beaver Brook CSO Station
Between VFW Highway and W. Sixth Street**

Location

The site is located on the north bank of the Merrimack River in Centralville neighborhood of Lowell. The site is located at the northeast side of the VFW Highway. The site is bounded by the VFW Highway to the west and south, residential areas to the north and east, and LTCP Site No. 6 to the southeast. The site is located approximately 800 feet southeast from the Beaver Brook CSO Station and approximately 300 feet east of the West Interceptor.

Ownership

The site (432 W Sixth Street) consists of one parcel owned by the City of Lowell. [GIS ID 6040-432, Book 1121, page 151]

Area

According to the City of Lowell assessor's map, the site has a land area of 0.83 acres.

Elevation

Based on City of Lowell topographic mapping, the site elevation ranges from 64 to 78 feet. The average site elevation is approximately 73 feet. (NAVD 88).

Site Access and Traffic

The site is accessible from West Sixth Street located west of the site. West Sixth Street is a moderately traveled residential road with some commercial use and should be able to accommodate construction traffic. Minor traffic delays might occur during high volume traffic periods of the day.

Current Land Use

The site is an open, grassed parcel.

Site Zoning

The site is zoned TSF Traditional Neighborhood Single Family Residential District. According to the zoning regulations, utilities and public service uses are permitted in these districts as a special exception only if the board of appeals determines and grants a special permit therefor as provided in Section 11-3, Appendix A-Zoning, of the Lowell Zoning Ordinance.

Surrounding Land Use/Zoning

The adjacent parcels to the north, east, and south of the site are also zoned within the same TSF Traditional Neighborhood Single Family Residential District. The VFW Highway is located west of the site.

Environment

Wetlands were not observed on the site or adjacent to the site. The site is not located within the 100-foot Buffer Zone or the 25-foot Riverfront Area.

According to the USDA Web Soil Survey, the soils on the site consist of the following: 653-Udorthents, sandy and 626B-Merrimac-Urban Land, complex, 0 to 8 percent slopes.

According to the Lowell Flood Insurance Rate Maps, the north-east portion of the site is located within the 100-year flood zone.

There are no listed Estimated Habitats and Priority Habitats of rare species within the site as indicated by the 2008 Priority and Estimated Habitat layers created by NHESP.

Historic Features

A review of the State Register of Historic Places and the Inventory of Historic and Archaeological Assets of the Commonwealth of the Massachusetts located at the Massachusetts Historical Commission did not identify any known historical structures or archaeological sites within the CSO site. The site does not appear to fall within a historic district.

Site 7A



**Site No. 7B-Beaver Brook CSO Station
Island Street and Aiken Street**

Location

The site is located on the north bank of the Merrimack River in the Centralville neighborhood of Lowell. The site is located at the northeast side of the VFW Highway. The site is bounded by Island Street to the north and west, and Aiken Street to the southeast. The site is located approximately 1,600 feet southeast from the Beaver Brook CSO Station and 300 feet north east of the West Interceptor.

Ownership

The site consists of one parcel (740 Aiken Street) owned by the City of Lowell. [GIS ID 0070, Book 1435, Page 576]

Area

According to the City of Lowell assessor's map, the site has a land area of 0.69 acres.

Elevation

Based on City of Lowell topographic mapping, the site is relatively flat with elevations ranging from 74 to 77 feet. The average site elevation is approximately 75 feet. (NAVD 88).

Site Access and Traffic

The site is accessible from the VFW Highway south west of the site and Aiken Street. The highway can experience moderate to heavy traffic volume during the high volume traffic period of the day but should be able to accommodate construction traffic without significant traffic delays. The site is also accessible from Island Street which runs along the north and west of the site. Island Street is a moderately traveled commercial road and should be able to accommodate construction traffic. Traffic delays might occur during high volume traffic periods of the day.

Current Land Use

The site is a parking lot and open paved area. It appears to service nearby businesses, and the adjacent baseball field to the north. The parking lot was minimally occupied at the time of the site visit.

Site Zoning

The site is zoned UMU Urban Mixed-Use District. According to the zoning regulations, utilities and public service uses are permitted in these districts as a special exception only if the board of appeals determines and grants a special permit therefor as provided in Section 11-3, Appendix A-Zoning, of the Lowell Zoning Ordinance.

Surrounding Land Use/Zoning

The site and adjacent parcels to the south are part of the same UMU Urban Mixed-Use District. North-west of the site is zoned TSF Traditional Neighborhood Single Family Residential District, and the parcels to the east of the site are zoned NB Neighborhood Business District. The VFW Highway is located west of the site.

Environment

Wetlands were not observed on the site or adjacent to the site. The site is not located within the 100-foot Buffer Zone or the 25-foot Riverfront Area.

According to the USDA Web Soil Survey, the soils on the site consist of the following: 653-Udorthents, sandy and 626B-Merrimac-Urban Land, complex, 0 to 8 percent slopes.

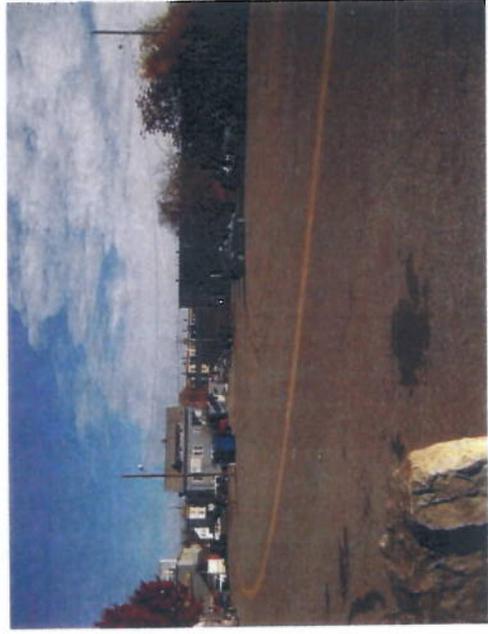
According to the Lowell Flood Insurance Rate Maps, the site is not located within the 100-year flood zone.

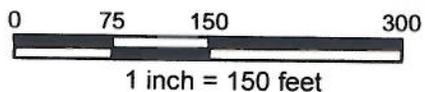
There are no listed Estimated Habitats and Priority Habitats of rare species within the site as indicated by the 2008 Priority and Estimated Habitat layers created by NHESP.

Historic Features

A review of the State Register of Historic Places and the Inventory of Historic and Archaeological Assets of the Commonwealth of the Massachusetts located at the Massachusetts Historical Commission did not identify any known historical structures or archaeological sites within the CSO site. The site does not appear to fall within a historic district.

Site 7B





Lowell, MA Sewer System
Satellite Site 2013 LTCP

November, 2013

**Site
8**

Site No. 8-Read CSO Station
South of VFW Highway at Nesmith Street

Location

The site is located north of the Merrimack River in the Centralville neighborhood of Lowell. The site is bound to the north by the Lowell-Lawrence Boulevard (VFW Highway), to the south by the Merrimack River, the west the Church of Nazarene and east by Nesmith Street. The Read CSO Station and Read Interceptor are located within the site.

Ownership

The site consists of one parcel of land owned by the City of Lowell. [GIS ID 2327-61]

Area

According to the City of Lowell assessor's map, the site has a land area of 3.85 acres.

Elevation

Based on the City of Lowell topographic mapping the site elevation ranges from 54 to 88 feet. The average site elevation is approximately 71 feet. There are steep grades down to the river on the south side of the site. (NAVD 88).

Site Access and Traffic

The site is accessible from the north by taking the Route 38 off-ramp from the eastbound lane of the VFW Highway. The site is an immediate right after entering the off-ramp. Although access to the site is limited, the VFW Highway should be able to accommodate construction traffic.

Current Land Use

The site is vegetated, open parcel with a walking path and contains a wooden ramp along the Merrimack River trail. The site contains a church parking lot, and a dog walking park. It also includes the Read CSO Station which is located below grade at the north boundary of the site, east of the site entrance, along with the connecting piping and a 60" diameter outfall pipe.

Site Zoning

The site is zoned TTF Traditional Neighborhood Two Family Residential District TMF Traditional Neighborhood Multi-Family Residential District. According to the zoning regulations, utilities and public service uses are permitted in these districts as a special exception only if the board of appeals determines and grants a special permit therefor as provided in Section 11-3, Appendix A-Zoning, of the Lowell Zoning Ordinance.

Surrounding Land Use/Zoning

The adjacent parcels to the west are zoned UMU Urban Mixed-Use District. The site is adjacent to the Church of the Nazarene and the church's parking lot to the east. There are residential properties directly north of the site across the VFW Highway.

Environment

There are wetlands on the site along the river bank. The site is also within the 100-foot Buffer Zone to bank and may be within the 25-foot Riverfront Area.

According to the USDA Web Soil Survey, the soils on the site consist of 656-Udorhents-Urban Land Complex.

According to the Lowell Flood Insurance Rate Maps, a small portion of the site directly along the Merrimack River is located within the 100-year flood zone.

There are no Estimated Habitats or Priority Habitats of rare species within this site as indicated by the 2008 Priority and Estimated Habitat layers created by NHESP. However, the site is adjacent to the Merrimack River which is listed as an Estimated Habitat (WH 65) and a Priority Habitat (PH 1321).

Historic Features

A review of the State Register of Historic Places and the Inventory of Historic and Archaeological Assets of the Commonwealth of the Massachusetts located at the Massachusetts Historical Commission did not identify any known historical structures or archaeological sites within the CSO site. The site is within the Lowell National Historical Park & Preservation District.

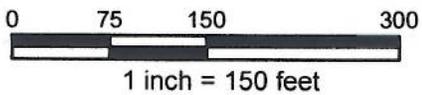
Site 8





Legend

-  2013 LTCP Sites
- 00** LTCP Site ID
-  Sewer Interceptor



Lowell, MA Sewer System
Satellite Site 2013 LTCP

November, 2013

**Site
9**

**Site No. 9-Read CSO Station
South of Route 110 at Nesmith Street**

Location

The site is located north of the Merrimack River in Centralville neighborhood of Lowell. The site is bounded to the north and east by the Lowell-Lawrence Boulevard (Route 110), to the south by the Merrimack River, and to the west by Nesmith Street. The site is located approximately 500 feet east from the Read CSO Structure. The Duck Island Interceptor is located within the site.

Ownership

The site consists of one parcel of land owned by the Commonwealth of Massachusetts. [GIS ID 5915-1600]

Area

According to the City of Lowell assessor's map, the site has a land area of 2.27 acres.

Elevation

Based on City of Lowell topographic mapping the site elevation ranges from 52 to 84 feet. The average site elevation is approximately 71 feet. The site has steep grades sloping from the street down to the river. (NAVD 88).

Site Access and Traffic

The site is accessible by taking the Route 110 on ramp in the eastbound direction from Nesmith Street. Site access is very limited from the north via the on-ramp. The site should be able to accommodate construction traffic without significant traffic delays.

Current Land Use

The site is heavily wooded vacant lot. A paved walking path with a guard rail is located at the river's edge.

Site Zoning

The site is zoned SSF Suburban Neighborhood Single Family Residential District and a small portion is zoned TTF Traditional Neighborhood Two Family Residential District. According to the zoning regulations, utilities and public service uses are permitted in this district as a special exception only if the board of appeals determines and grants a special permit therefor as provided in Section 11-3, Appendix A-Zoning, of the Lowell Zoning Ordinance.

Surrounding Land Use/Zoning

Vacant land abuts the site to the east, Nesmith Street to the west, and the Merrimack River abuts the site to the south. East/west lanes of Route 110 and a vegetated hillside isolate the site from residential properties to the north.

Environment

There are wetlands on the site along the bank which abuts the Merrimack River. The site is also within the 100-foot Buffer Zone to bank and may be within the 25-foot Riverfront Area.

According to the USDA Web Soil Survey, the soils on the site consist of 656-Udorhents-Urban Land Complex.

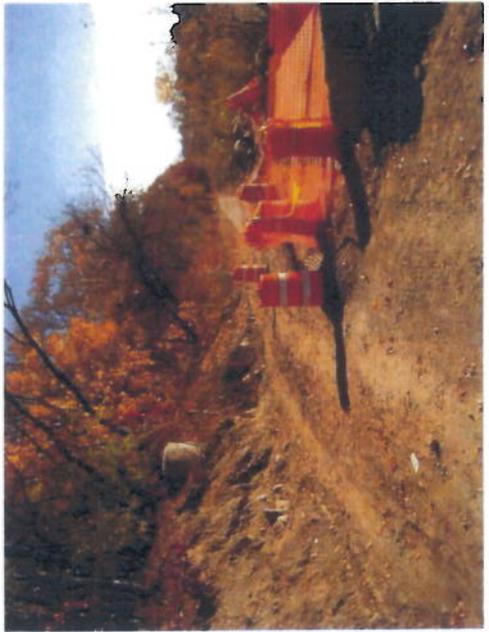
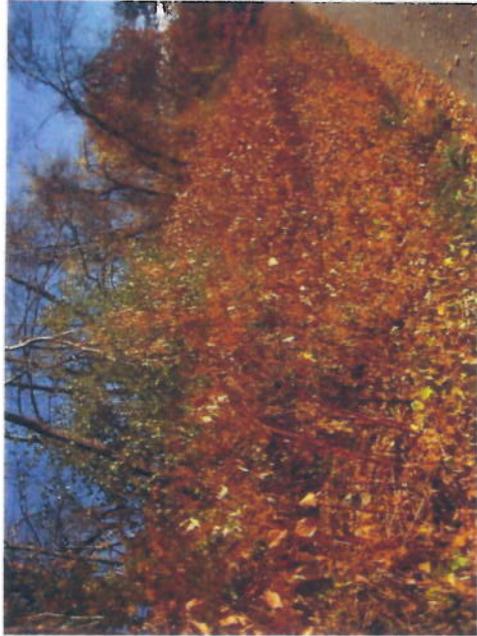
According to the Lowell Flood Insurance Rate Maps, a small portion of the site directly along the Merrimack River is located within the 100-year flood zone.

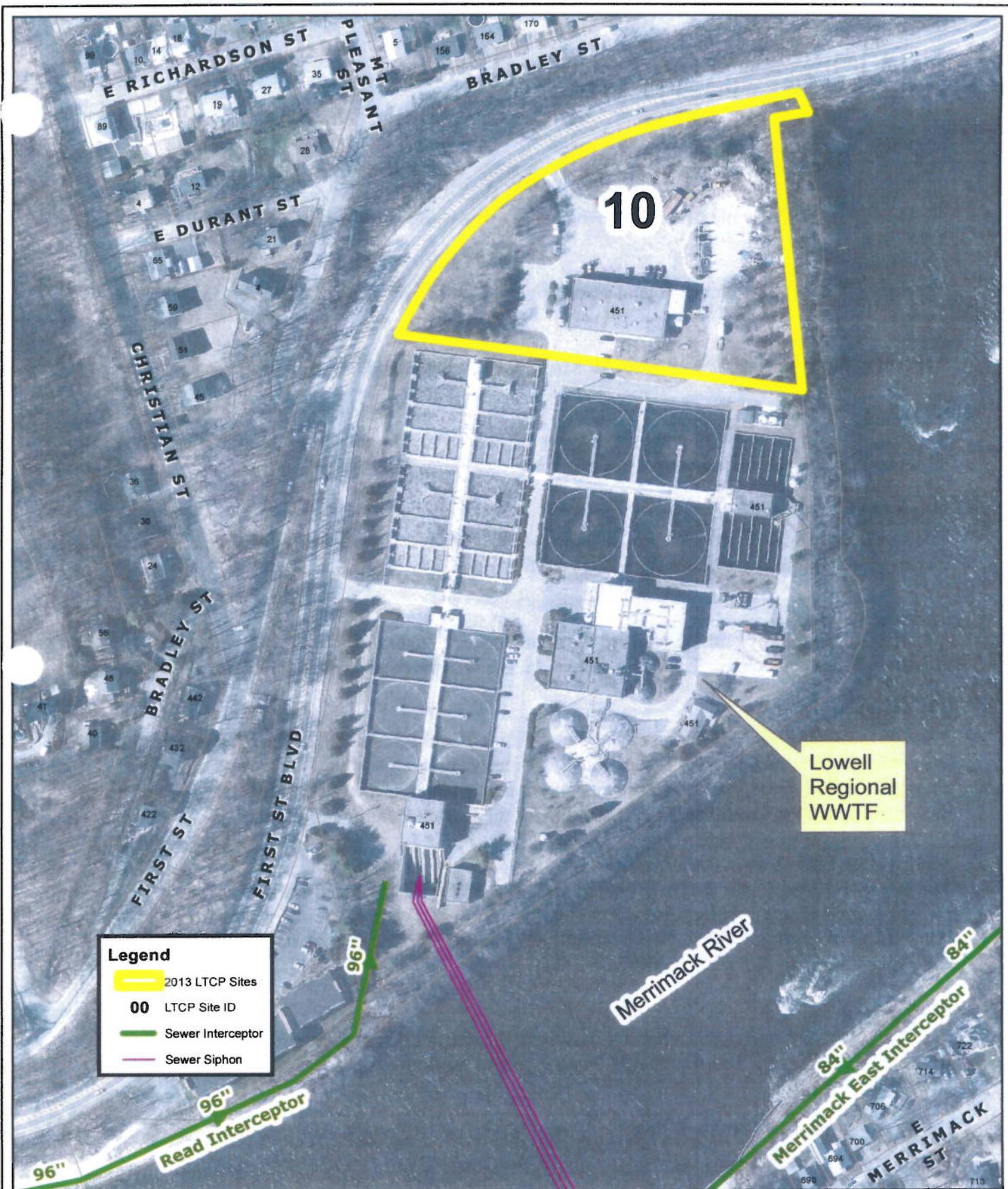
There are no Estimated Habitats or Priority Habitats of rare species within this site as indicated by the 2008 Priority and Estimated Habitat layers created by NHESP. However, the site is adjacent to the Merrimack River which is listed as an Estimated Habitat (WH 65) and a Priority Habitat (PH 1321).

Historic Features

A review of the State Register of Historic Places and the Inventory of Historic and Archaeological Assets of the Commonwealth of the Massachusetts located at the Massachusetts Historical Commission did not identify any known historical structures or archaeological sites within the CSO site. The site does not appear to fall within a historic district.

Site 9





Legend

- 2013 LTCP Sites
- 00** LTCP Site ID
- Sewer Interceptor
- Sewer Siphon

Lowell
Regional
WWTF

Lowell, MA Sewer System
Satellite Site 2013 LTCP

November, 2013

**Site
10**

**Site No. 10-Duck Island Wastewater Treatment Facility
South of Route 110 at Dracut Town Line**

Location

The site is located north of the Merrimack River at the Lowell boundary. The site is located at the Duck Island Wastewater Treatment Facility (WWTF). The site is bounded to the south by the WWTF, the east by the Merrimack River, and to the north and west by Route 110.

Ownership

The site consists of one parcel of land owned by the City of Lowell. [GIS ID 2327-431]

Area

According to the City of Lowell assessor's map, the site has a land area of 4.11 acres.

Elevation

Based on City of Lowell topographic mapping the site is flat with elevations ranging from 64 to 66 feet. The average site elevation is approximately 65 feet. (NAVD 88).

Site Access and Traffic

The site is accessible from the north by Route 110. Route 110 should be able to accommodate construction equipment without significant traffic delays.

Current Land Use

The site is occupied by parking lots and the maintenance division for the WWTF including materials and parts storage. The remainder of the site is comprised of maintained lawn.

Site Zoning

The site is zoned SSF Suburban Neighborhood Single Family Residential District. According to the zoning regulations, utilities and public service uses are permitted in this district as a special exception only if the board of appeals determines and grants a special permit therefor as provided in Section 11-3, Appendix A-Zoning, of the Lowell Zoning Ordinance.

Surrounding Land Use

The site and the parcel located to the south west of the WWTP are zoned SSF Suburban Neighborhood Single Family Residential District. North and west of the site across Route 110 are residential neighborhoods. South and east of the site is the Merrimack River. The WWTF maintenance garage is directly south of the site.

Environment

Wetlands were not observed on the site, however, the site is in close proximity to the Merrimack River and is within the 100-foot Buffer Zone to Inland Bank. It is not located within the 25-foot Riverfront Area.

According to the USDA Web Soil Survey, The soils on the site consist of the following: 603-Urban Land, wet substratum and 422D-Canton, fine sandy loam, 15 to 20 percent slopes, extremely stony.

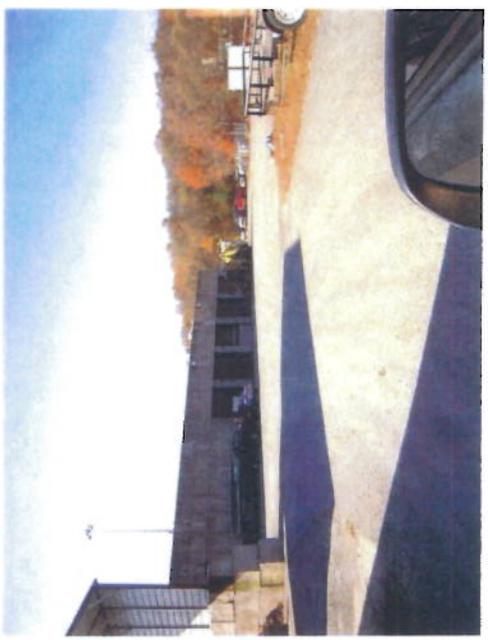
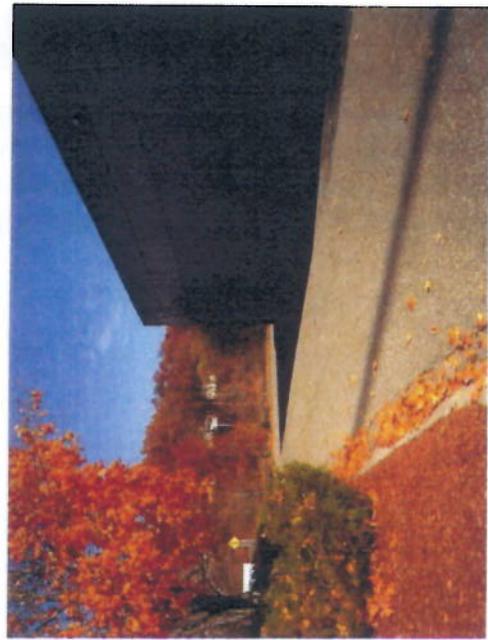
According to the Lowell Flood Insurance Rate Maps, the site is not located within the 100-year flood zone.

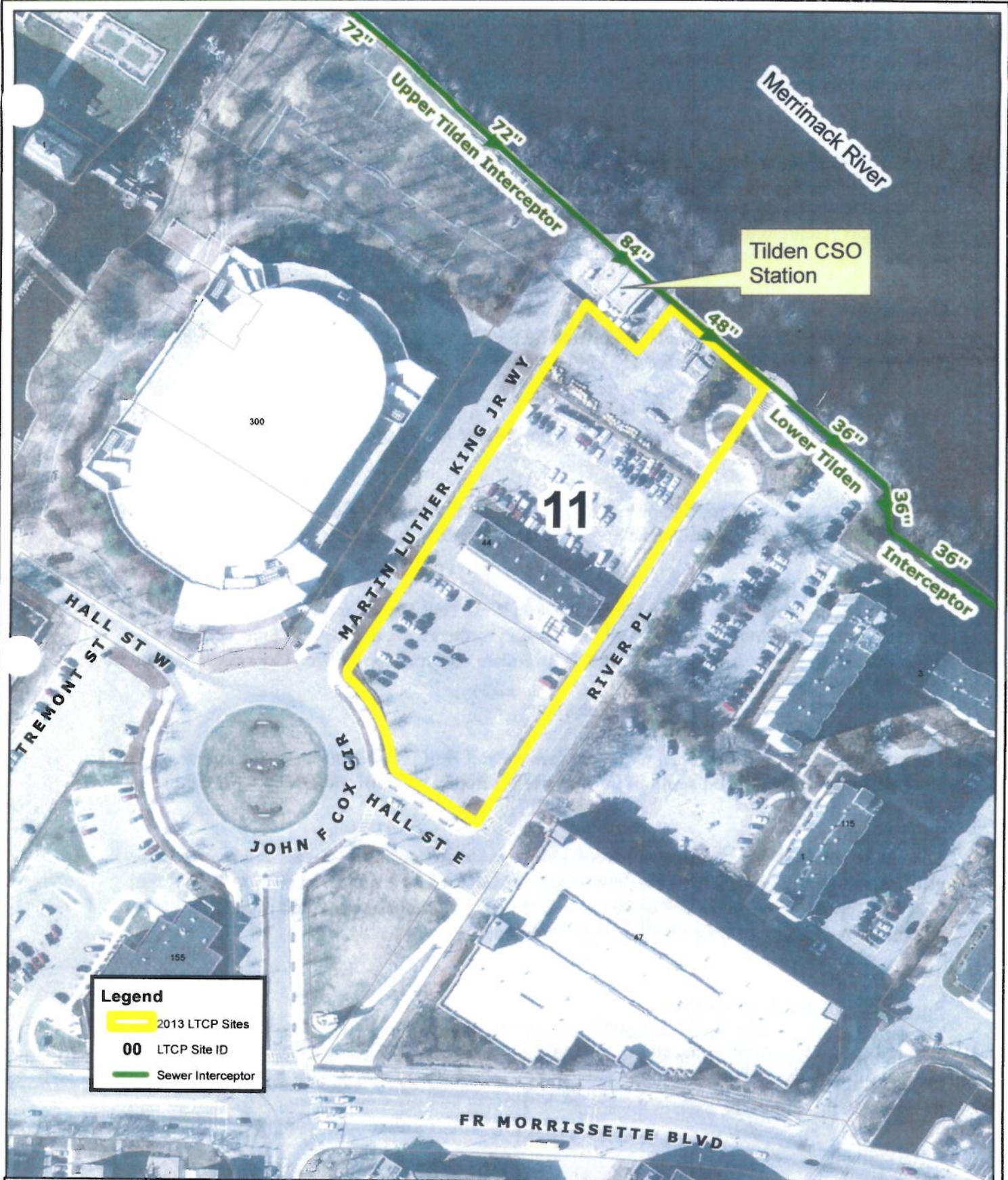
There are no Estimated Habitats or Priority Habitats of rare species within this site as indicated by the 2008 Priority and Estimated Habitat layers created by NHESP. However, the site is adjacent to the Merrimack River which is listed as an Estimated Habitat (WH 65) and a Priority Habitat (PH 1321).

Historic Features

A review of the State Register of Historic Places and the Inventory of Historic and Archaeological Assets of the Commonwealth of the Massachusetts located at the Massachusetts Historical Commission did not identify any known historical structures or archaeological sites within the CSO site. The site does not appear to fall within a historic district.

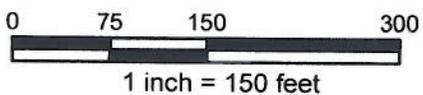
Site 10





Legend

- 2013 LTCP Sites
- 00** LTCP Site ID
- Sewer Interceptor



Lowell, MA Sewer System
 Satellite Site 2013 LTCP

November, 2013

**Site
 11**

Site No. 11-Tilden CSO Station North End of Post Office Square

Location

The site is located on the south bank of the Merrimack River at the north end of Arcand Drive and Post Office Square. The site is bounded to the north by the Merrimack River, to the east by the River Place Towers, to the south by Hall Street and the George Ayotte Parking Garage, and the Tsongas Arena to the west. The Tilden CSO Station and the Lower Tilden Interceptor abut the site.

Ownership

The site consists of one parcel of land owned by the University of Massachusetts Building Authority. [GIS ID 4735-152, Book 23740, Page 1]

Area

According to the City of Lowell assessor's map, the site has a land area of 2.82 acres.

Elevation

Based on City of Lowell topographic mapping, the site is relatively flat with elevations ranging from 72 to 82 feet. The average site elevation is approximately 76 feet. (NAVD 88).

Site Access and Traffic

The site is accessible from Martin Luther King Jr Way, Hall Street, and River Place. All roads are moderately to heavily traveled roads by visitors to the arena, and River Place Tower residents. Both roads should be able to accommodate construction traffic. Coordination may be required with Tsongas Arena events.

Current Land Use

The site contains a building used by the UMass Lowell Building Authority in the center, with large parking lots north and south of it. The site is directly south of the Tilden CSO Station.

Site Zoning

The site is zoned DMU Downtown Mixed-Use District. According to the zoning regulations, utilities and public service uses are permitted in this district as a special exception only if the board of appeals determines and grants a special permit therefor as provided in Section 11-3, Appendix A-Zoning, of the Lowell Zoning Ordinance.

Surrounding Land Use/Zoning

The site and all adjacent land areas comprise a DMU Downtown Mixed-Use District. The land area to the south portion of the site is zoned B2-A Intermediate Business District. The site is located directly east of the Tsongas Arena and west of the River Place Towers. The Merrimack River abuts the site to the east.

Environment

There are wetlands on the site along the Merrimack River bank. The site is within the 100-foot Buffer Zone to Bank and may be within the 25-foot Riverfront Area.

According to the USDA Web Soil Survey, the soils on the site consist of 602-Urban Land.

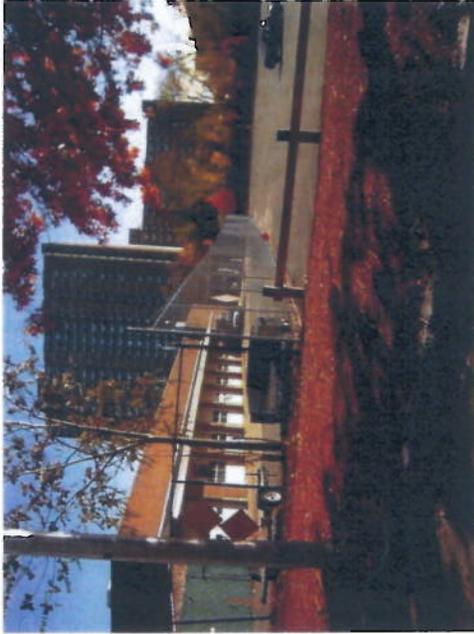
According to the Lowell Flood Insurance Rate Maps, the north portion of the site is located within the 100-year flood zone.

There are no Estimated Habitats or Priority Habitats of rare species within this site as indicated by the 2008 Priority and Estimated Habitat layers created by NHESP. However, the site is adjacent to the Merrimack River which is listed as an Estimated Habitat (WH 65) and a Priority Habitat (PH 1321).

Historic Features

A review of the State Register of Historic Places and the Inventory of Historic and Archaeological Assets of the Commonwealth of the Massachusetts located at the Massachusetts Historical Commission did not indicate any known historical structures or archaeological sites within the CSO site. The site appears to fall within the Lowell National Historical Park & Preservation District, and the Downtown Lowell Historical District.

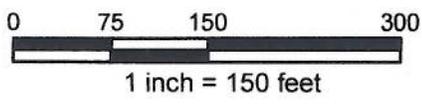
Site 11





Legend

- 2013 LTCP Sites
- 00** LTCP Site ID



Lowell, MA Sewer System
Satellite Site 2013 LTCP

November, 2013

**Site
12**

Site No. 12–Green Infrastructure North Common

Location

The site known as the North Common is located north of the Pawtucket Canal and south of the Northern Canal in The Acre neighborhood of Lowell. The site includes the Murkland Elementary School and playing fields. The site is bounded by Fletcher Street to the west, Cross Street to the south, Adams Street to the east, and Hancock Avenue to the north.

Ownership

The site consists of one parcel owned by the City of Lowell – North Common. [Map 135, parcel 100]

Area

According to the City of Lowell assessor's map, the site has a land area of 9.32 acres.

Elevation

Based on City of Lowell topographic mapping, the site has a fairly steep grade starting in the north west corner sloping to south and south east with elevations ranging from 101 to 139 feet. The average site elevation is approximately 115 feet. (NAVD 88).

Site Access and Traffic

The site is large and has multiple points of access on Fletcher Street, Cross Street, and Adams Street. All streets experience moderate traffic and should be able to accommodate construction traffic without significant delay.

Current Land Use

The site contains Murkland Elementary School in the center, and a baseball field and athletic courts to the south. The north-west portion of the site contains a grassed park with walking paths and wooded areas.

Site Zoning

The site is zoned UMF Urban Neighborhood Multi-Family Residential District. According to the zoning regulations, utilities and public service uses are permitted in these districts as a special exception only if the board of appeals determines and grants a special permit therefor as provided in Section 11-3, Appendix A-Zoning, of the Lowell Zoning Ordinance.

Surrounding Land Use

The site and adjacent land to the north, east, and south are all part of the same UMF Urban Neighborhood Multi-Family Residential District. The land area to the west is TMF Traditional Neighborhood Multi-Family Residential District.

Environment

Wetlands were not observed on the site or adjacent to the site. The site is not located within the 100-foot Buffer Zone or the 25-foot Riverfront Area.

According to the USDA Web Soil Survey, the soils on the site consist of 654-Udorthents, loamy, 415C-Narragansett silt loam, 8 to 15 percent slopes, 602-Urban Land and 631C-Charlton-Urban land-Hollis complex, 3 to 15 percent slopes, rocky.

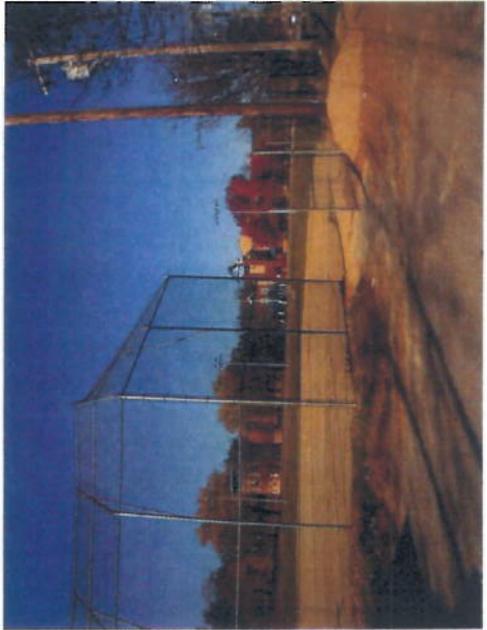
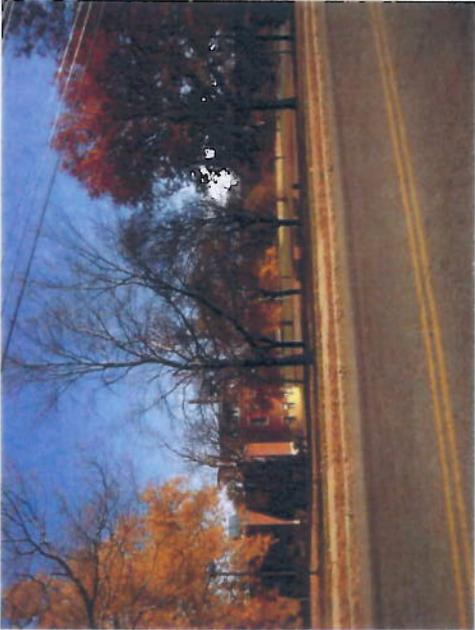
According to the Lowell Flood Insurance Rate Maps, the site is not located within the 100-year flood zone.

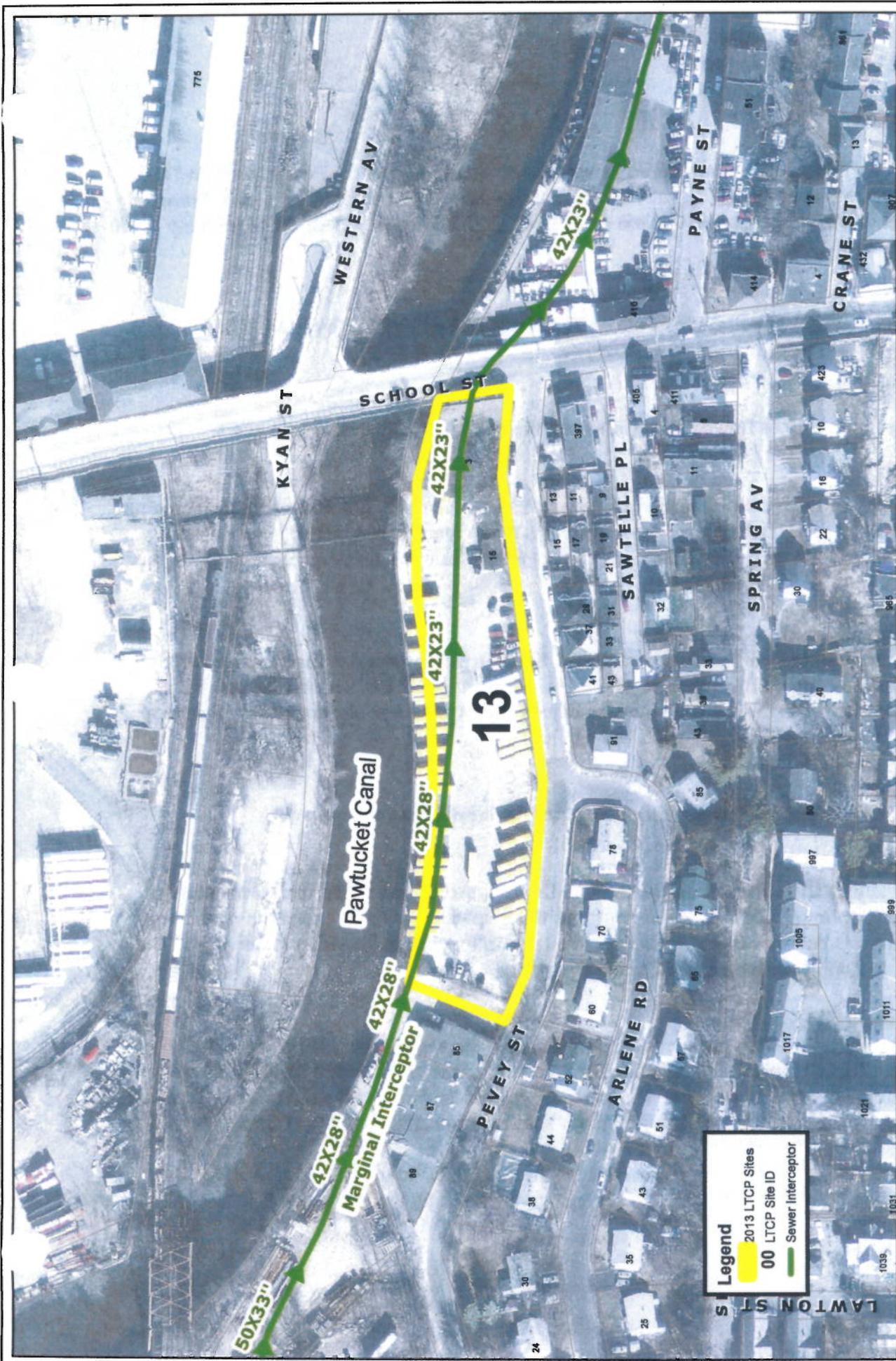
There are no Estimated Habitats or Priority Habitats of rare species within the site as indicated by the 2008 Priority and Estimated Habitat layers created by NHESP.

Historic Features

A review of the State Register of Historic Places and the Inventory of Historic and Archaeological Assets of the Commonwealth of the Massachusetts located at the Massachusetts Historical Commission did not identify any known historical structures or archaeological sites within the CSO site. The site does not appear to be within a historical district.

Site 12





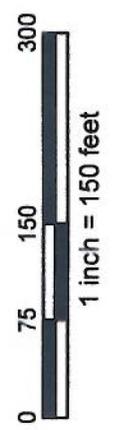
Site 13

Lowell, MA Sewer System
 Satellite Site 2013 LTCP

November, 2013

Legend

- 2013 LTCP Sites
- 00 LTCP Site ID
- Sewer Interceptor



Site No. 13-Warren CSO Station Pevey Street and School Street

Location

The site is located directly south of the Pawtucket Canal and adjacent to Pevey Street in The Acre neighborhood of Lowell. The site is bounded by School Street to the east. The Marginal Interceptor is located within the site and the Warren CSO Station is located approximately 5,000 feet to the east.

Ownership

The site (391 School Street) consists of one parcel owned by JJ McCarthy LLC. [GIS ID 5240-391, Book 20444, page 75]

Area

According to the City of Lowell assessor's map, the site has a land area of 1.75 acres.

Elevation

Based on City of Lowell topographic mapping, the site is relatively flat with elevations ranging from 100 to 112 feet. The average site elevation is approximately 102 feet. There is a steep portion of the site on the eastern most side as the grade rises from the average elevation of the site up to School Street. (NAVD 88).

Site Access and Traffic

The site is accessible from Pevey Street. Pevey Street is an intermediate road that appears to have moderate to low traffic volumes. The site serves as a school bus parking lot so it may experience busier than normal traffic during departure/arrivals. The site appears to be able to accommodate construction equipment and traffic.

Current Land Use

The site is a large parking lot currently being used for school bus parking.

Site Zoning

The site is zoned TMU Traditional Mixed-Use District. According to the zoning regulations, utilities and public service uses are permitted in this district as a special exception only if the board of appeals determines and grants a special permit therefor as provided in Section 11-3, Appendix A-Zoning, of the Lowell Zoning Ordinance.

Surrounding Land Use/Zoning

The site and the adjacent parcel across School Street to the west are part of the same TMU Traditional Mixed-Use District. The parcel to the west of the site is zoned LI Light Industry, Manufacturing, & Storage District. The site and adjacent land east of the site are all part of the same 1A Warehousing, Storage & Light Manufacturing Industrial District. Adjacent parcels to the south fall in the Residential Districts with the parcels to the south-east falling in a USF Urban Neighborhood Single Family and the parcels to the south-west in the TSF Traditional Neighborhood Single Family. The site is bound to the north by the Pawtucket Canal.

Environment

There were no observed wetlands within the site. Portions of the site are within both the 25-foot Riverfront Area and the 100-foot Buffer Zone to Bank.

According to the USDA Web Soil Survey, the soils on the site consist of 602-Urban Land.

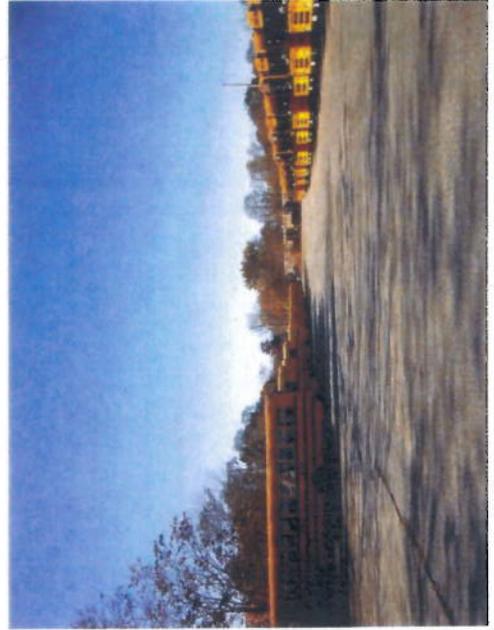
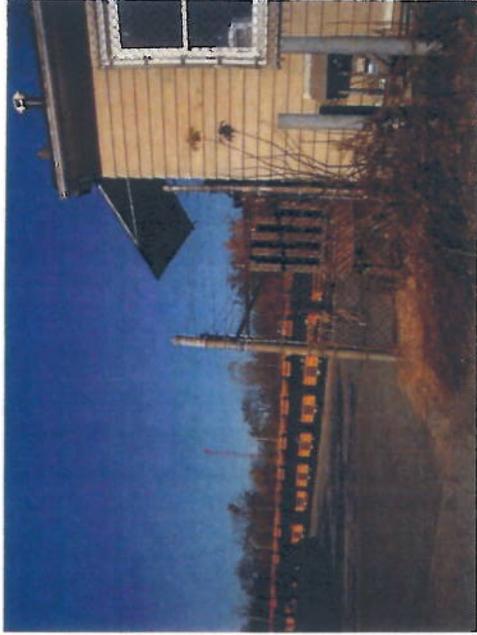
According to the Lowell Flood Insurance Rate Maps, a very small portion of the site is located within the 100-year flood zone.

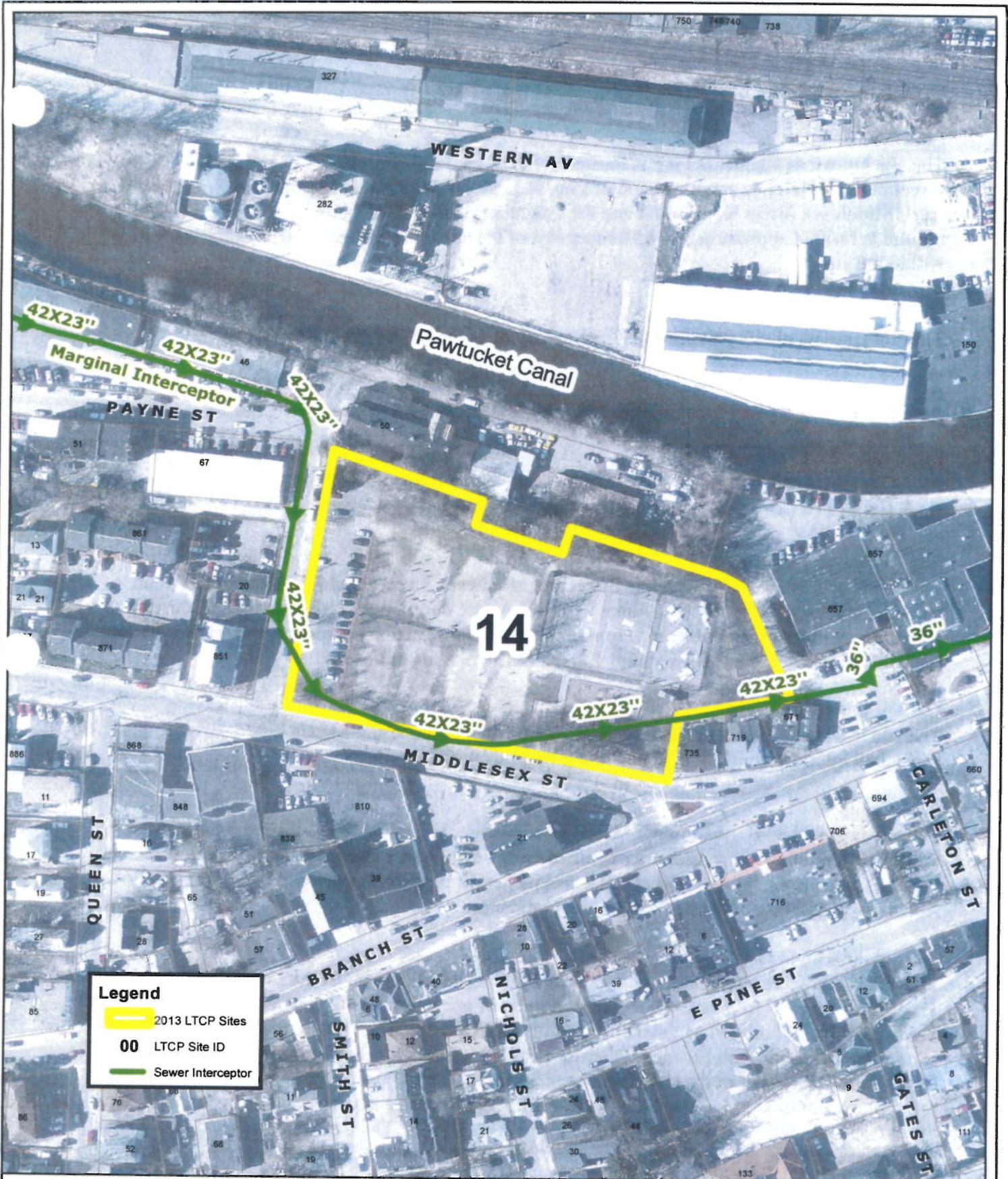
The site is located south of the Pawtucket Canal, which is a tributary of the Merrimack River. The Merrimack River is listed as an Estimated Habitat (WH 65) and a Priority Habitat (PH 1321) as indicated by the 2008 Priority and Estimated Habitat layers created by NHESP.

Historic Features

A review of the State Register of Historic Places and the Inventory of Historic and Archaeological Assets of the Commonwealth of the Massachusetts located at the Massachusetts Historical Commission did not identify any known historical structures or archaeological sites within the CSO site. The site falls within the Lowell National Historical Park & Preservation District, and the Downtown Lowell Historical District.

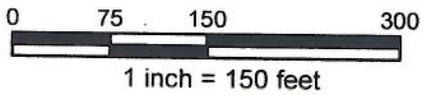
Site 13





Legend

- 2013 LTCP Sites
- 00** LTCP Site ID
- Sewer Interceptor



Lowell, MA Sewer System
Satellite Site 2013 LTCP

November, 2013

**Site
14**

**Site No. 14-Warren CSO Station
Saunders Street and Middlesex Street – Clemente Park**

Location

The site known as Clemente Park is located south of the Pawtucket Canal and along Middlesex Street in the Highlands neighborhood of Lowell. The site is bounded by Saunders Street to the west, Middlesex Street to the south and the Pawtucket Canal to the north. The Warren CSO Station is located approximately 4,500 feet east of the site. The Marginal Interceptor is located within the site.

Ownership

The site consists of one parcel owned by the City of Lowell. [GIS ID 4085-803].

Area

According to the City of Lowell assessor's map, the site has a land area of 2.99 acres.

Elevation

Based on City of Lowell topographic mapping, the site is relatively flat with elevations ranging from 100 to 110 feet. The average site elevation is approximately 108 feet. (NAVD 88).

Site Access and Traffic

The site is accessible from Saunders Street and Middlesex Street. Middlesex Street is a main road and can experience relatively heavy traffic volume during peak traffic periods of the day. However, both roads should be able to accommodate construction equipment and traffic. Minor traffic delays might occur during high volume traffic periods of the day.

Current Land Use

The site is an open parcel comprised of recreational areas including a skate board park, basketball courts, volleyball courts, a playground area, and a parking lot.

Site Zoning

The site is zoned TMU Traditional Mixed-Use District. According to the zoning regulations, utilities and public service uses are permitted in this district as a special exception only if the board of appeals determines and grants a special permit therefor as provided in Section 11-3, Appendix A-Zoning, of the Lowell Zoning Ordinance.

Surrounding Land Use/Zoning

The site and adjacent land north, east and west of the site are all part of the same TMU Traditional Mixed-Use District with the exception of one parcel to the west which is zoned TMF Traditional Neighborhood Multi-Family Residential District. The land to the south of the site is zoned NB Neighborhood Business District. The multi-use park is bordered by Sanders Street and B & J Auto Sales west of the site, Middlesex Street and small businesses across the street to the south including Lowell Discount Carpet, Lowell Auto Repair, a small vacant building, and Pailin Plaza (with a video store, hair design, and insurance agency). The Lowell Boys and Girls Club and Apsara Jewelry are to the east of the site. Small businesses including Meng's A& B Auto Repair and Diamond Yellow Taxi Cab are located north of the site, on the other side of the park fence along Payne Street. The Pawtucket Canal borders Payne Street to the north. There are no residential properties in the immediate vicinity of the site.

Environment

Wetlands were not observed on the site or adjacent to the site. The site is not located within the 100-foot Buffer Zone or the 25-Foot Riverfront Area

According to the USDA Web Soil Survey, the soils on the site consist of 654-Udorthents Loamy and 602-Urban Land.

According to the Lowell Flood Insurance Rate Maps, the site is not located within the 100-year flood zone.

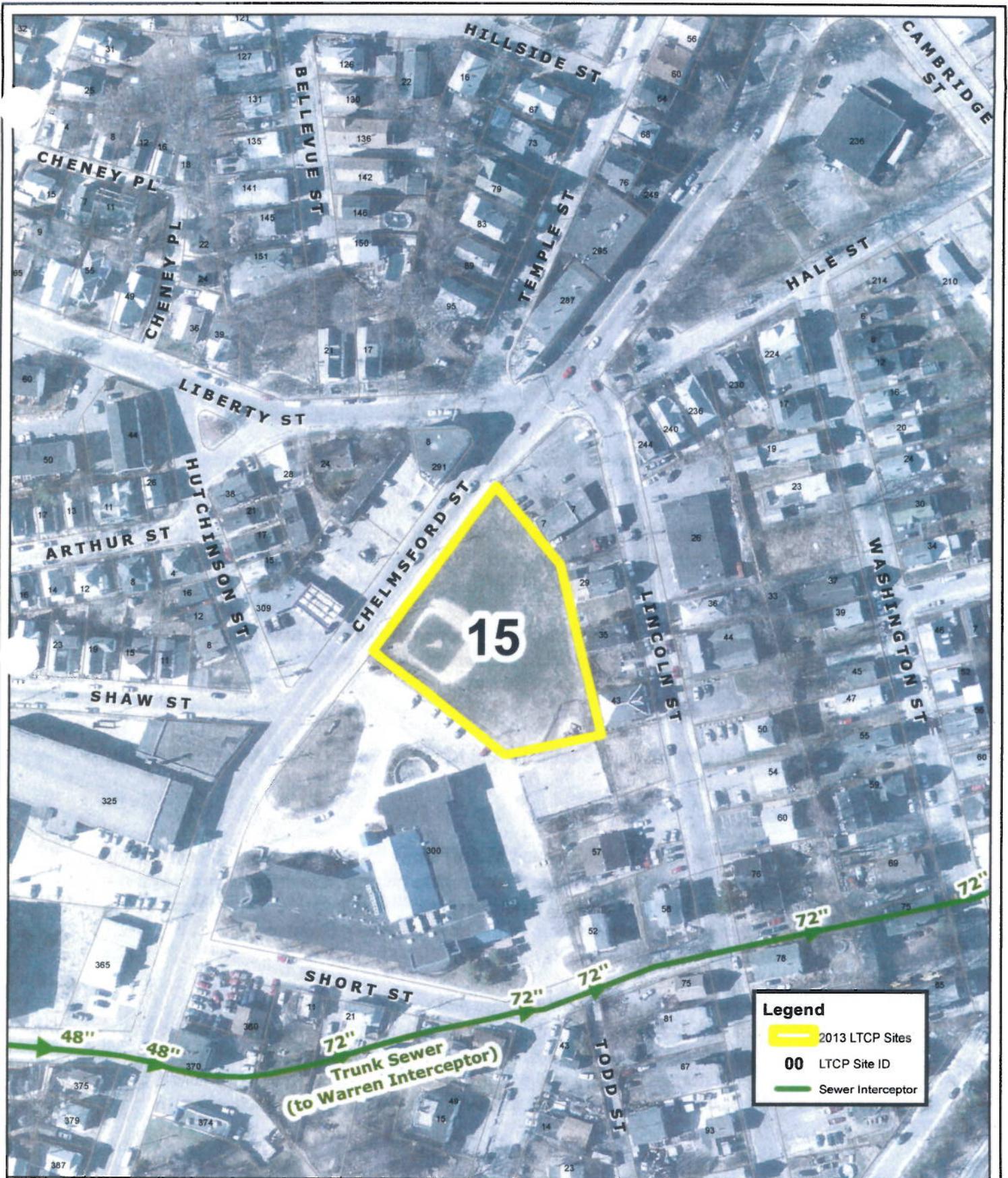
There are no Estimated Habitats or Priority Habitats of rare species within the site as indicated by the 2008 Priority and Estimated Habitat layers created by NHESP.

Historic Features

A review of the State Register of Historic Places and the Inventory of Historic and Archaeological Assets of the Commonwealth of the Massachusetts located at the Massachusetts Historical Commission did not identify any known historical structures or archaeological sites within the CSO site. The site does not appear to fall within a historic district.

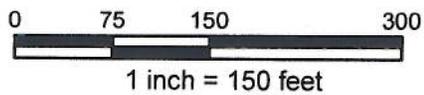
Site 14





Legend

- 2013 LTCP Sites
- 00** LTCP Site ID
- Sewer Interceptor



Lowell, MA Sewer System
Satellite Site 2013 LTCP

November, 2013

**Site
15**

**Site No. 15-Warren CSO Station
Chelmsford Street and Hutchins Street**

Location

The site is located west of River Meadow Brook in the Highlands neighborhood of Lowell. The site is located along Chelmsford Street (Route 110) to the north and west, and bound by Lincoln Street to the east and the Abraham Lincoln Elementary School to the south. The site is located approximately 6,000 feet southwest from the Warren CSO Station. The site is located approximately 300 feet north of an 84-inch trunk sewer that contributes to the Warren Interceptor.

Ownership

The site consists of one parcel owned by the City of Lowell, Lincoln School. [GIS ID 1190-294, Book 951, Page 251]

Area

According to the City of Lowell assessor's map, the site has a land area of 1.06 acres.

Elevation

Based on City of Lowell topographic mapping, the site is flat with elevations ranging from 118 to 120 feet. The average site elevation is approximately 119 feet. (NAVD 88).

Site Access and Traffic

The site is accessible from Route 110. The road can experience moderate to heavy traffic volume during peak traffic periods but should be able to accommodate construction equipment. Traffic delays may occur during high traffic periods of the day.

Current Land Use

The site is an open parcel comprised of a softball field located adjacent to the Abraham Lincoln Elementary School.

Site Zoning

The site is zoned TMF Traditional Neighborhood Multi-Family Residential District. According to the zoning regulations, utilities and public service uses are permitted in these districts as a special exception only if the board of appeals determines and grants a special permit therefor as provided in Section 11-3, Appendix A-Zoning, of the Lowell Zoning Ordinance.

Surrounding Land Use/Zoning

The site and adjacent parcels to the south and east are part of the same TMF Traditional Neighborhood Multi-Family Residential District. The parcels to the north and west of the site are zoned as NB Neighborhood Business District. Residential houses occupy Lincoln Street east of the site. A gas station, storage building and parking lot are located on Route 110 across the street from the site to the north and west. The Lincoln Elementary School is located south of the site.

Environment

Wetlands were not observed on the site or adjacent to the site. The site is not located within the 100-foot Buffer Zone or the 25-foot Riverfront Area.

According to the USDA Web Soil Survey, the soils on the site consist of 602-Urban Land.

According to the Lowell Flood Insurance Rate Maps, the site is not located within the 100-year flood zone.

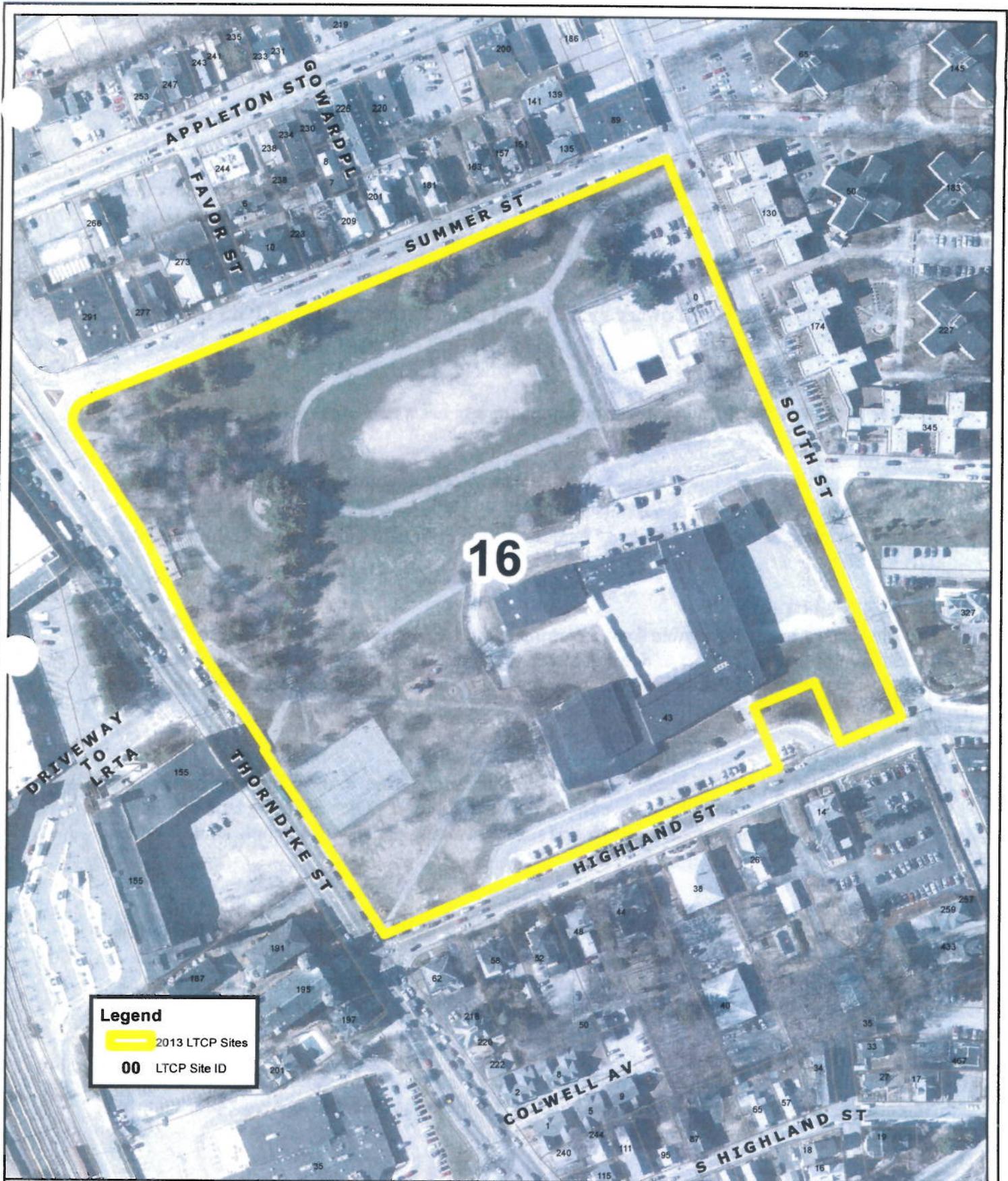
There are no Estimated Habitats or Priority Habitats of rare species within the site as indicated by the 2008 Priority and Estimated Habitat layers created by NHESP.

Historic Features

A review of the State Register of Historic Places and the Inventory of Historic and Archaeological Assets of the Commonwealth of the Massachusetts located at the Massachusetts Historical Commission did not identify any known historical structures on the site, however the Abraham Lincoln Elementary School adjacent to the site is a historic feature (Low.357). There were not any known archaeological sites identified within the CSO site. The site does not appear to fall within a historic district.

Site 15





Lowell, MA Sewer System
Satellite Site 2013 LTCP

Site
16

November, 2013

Site No. 16-Green Infrastructure South Common

Location

The site known as the South Common is located in the Back Central neighborhood of Lowell. The site is bounded by Summer Street to the north, South Street to the east, Highland Street to the south, and Thorndike Street to the west. The Lowell Public Schools Administration Office is located within the site.

Ownership

The site consists of one parcel owned by the City of Lowell – South Common [GIS ID 5425-200, 1466, Page 391].

Area

According to the City of Lowell assessor's map, the site has a land area of 20.31 acres.

Elevation

Based on City of Lowell topographic mapping, the site elevation ranges from 100 to 138 feet. The average site elevation is approximately 116 feet. The site grading drops from Summer Street, Thorndike Street and Highland Street to the soccer field in the center and South Street. (NAVD 88).

Site Access and Traffic

The site is most easily accessible from a parking lot and access road located on the south west intersection of Summer Street and South Street. Both roads are in good condition and should be able to accommodate construction traffic to Thorndike Street and The Lowell Connector without significant traffic delays.

Current Land Use

The site contains the Lowell Public Schools Administration Office in the south east, tennis courts in the south west, and a public swimming pool in the north east. The remaining land contains a large athletic field surrounded by a track and several walking paths with a couple small wooded areas.

Site Zoning

The site is zoned TMF Traditional Neighborhood Multi-Family Residential District. According to the zoning regulations, utilities and public service uses are permitted in these districts as a special exception only if the board of appeals determines and grants a special permit therefor as provided in Section 11-3, Appendix A-Zoning, of the Lowell Zoning Ordinance.

Surrounding Land Use/Zoning

The site and adjacent parcels to the north and south are all part of the same TMF Traditional Neighborhood Multi-Family Residential District. The parcels to the east and west of the site are zoned UMU Urban Mixed-Use District.

Environment

Wetlands were not observed on the site or adjacent to the site. The site is not located within the 100-foot Buffer Zone or the 25-foot Riverfront Area.

According to the USDA Web Soil Survey, the soils on the site consist of 655-Udorthents, wet substratum and 602-Urban Land.

According to the Lowell Flood Insurance Rate Maps, the site is not located within the 100-year flood zone.

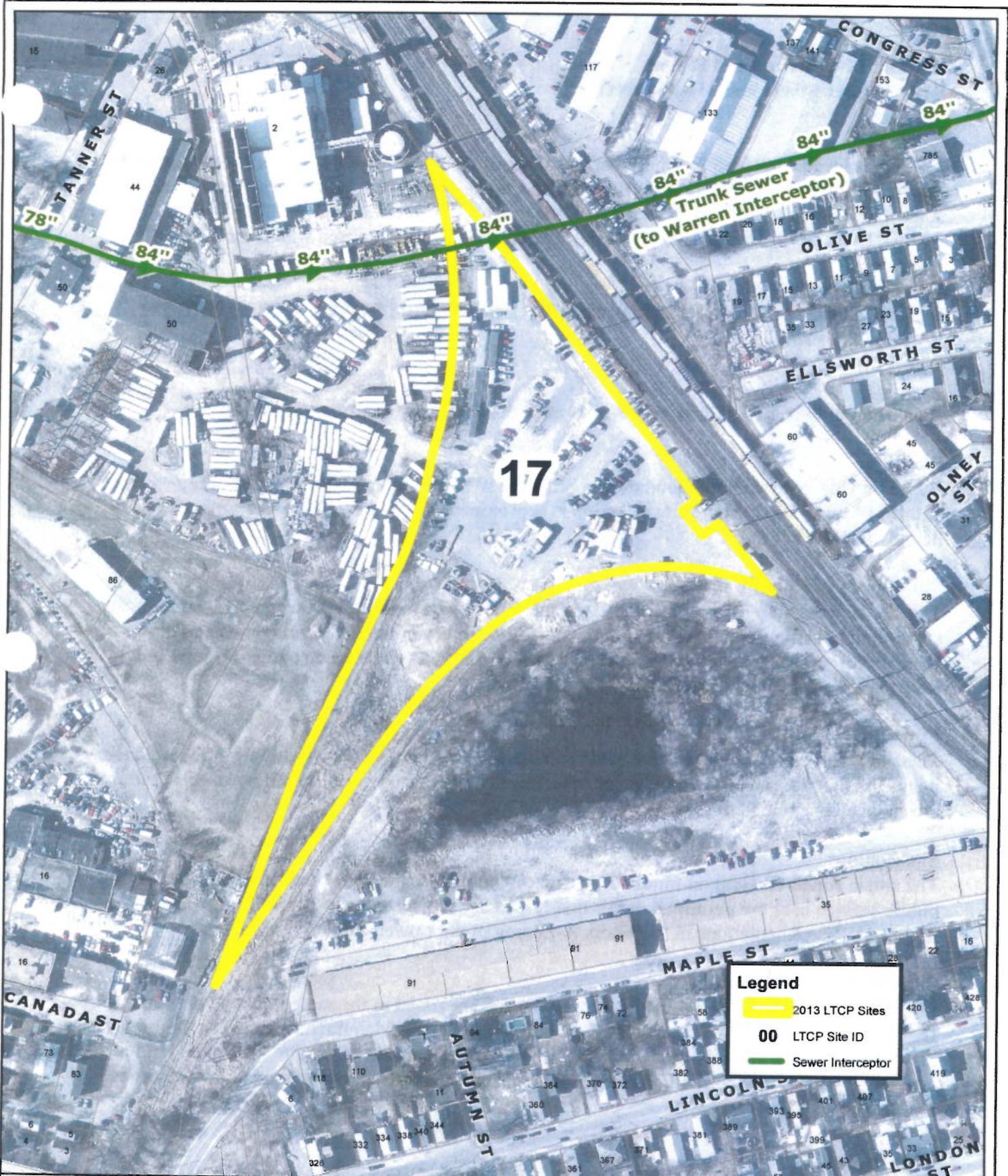
There are no Estimated Habitats or Priority Habitats of rare species within the site as indicated by the 2008 Priority and Estimated Habitat layers created by NHESP.

Historic Features

A review of the State Register of Historic Places and the Inventory of Historic and Archaeological Assets of the Commonwealth of the Massachusetts located at the Massachusetts Historical Commission did not identify any known historical structures or archaeological sites within the CSO site. The site appears to fall within the South Common Historical District (Low.9005).

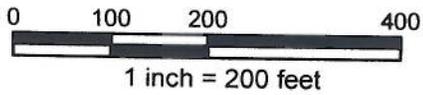
Site 16





17

84" Trunk Sewer
(to Warren Interceptor)



Lowell, MA Sewer System
Satellite Site 2013 LTCP

Site
17

November, 2013

**Site No. 17-Warren CSO Station
Rear Tanner Street and Maple Street**

Location

The site is located north of Maple Street and south of the River Meadow Brook in South Lowell. The site is bounded by abandoned railroad tracks to the north, west, east and by wetlands to the south. The site is located approximately 5,000 feet southwest of the Warren CSO Station. An 84-inch trunk sewer that contributes to the Warren Interceptor is located within the site.

Ownership

The site consists of one parcel and is owned by Lowell Iron and Steel Co. [GIS ID 3620-282, Book 10868, Page 207]

Area

According to the City of Lowell assessor's map, the site has a land area of 5.94 acres.

Elevation

Based on City of Lowell topographic mapping, the site is fairly flat with elevations ranging from 110 to 114 feet. The average site elevation is approximately 110 feet. (Elevations presented herein are NAVD 88).

Site Access and Traffic

The site is accessible from a dirt road off Maple Street. The road should be able to accommodate construction traffic without significant traffic delay. However, a railroad bridge located on Gorham Street (Route 3A) has low clearance which may prevent large construction vehicles from travelling through certain areas.

Current Land Use

The site is a vacant wooded lot that abuts a pond and wetlands to the south. During the site visit it appears that the majority of the site is not currently in use, however, a small portion is used for miscellaneous equipment storage.

Site Zoning

The site is zoned GI General Industry District. According to the zoning regulations, utilities and public service uses are permitted in this district but are subject to such requirements specified in Article IV-Use Regulations in Appendix A-Zoning of the Lowell Zoning Ordinance.

Surrounding Land Use/Zoning

The site and Parcels to the north and west of the site are zoned in the same GI General Industry District. South and east of the site is zoned LI Light Industry, Manufacturing, and Storage. At the time of the site visit a hazardous waste site was observed west of the site. All other land surrounding the site is currently used for industrial purposes. No parks or residential properties are located near the site.

Environment

Wetlands were not observed on the site, however, the site abuts a pond to the south and the southern portion of the site is located within the 100-foot Buffer Zone of Bordering Vegetated Wetlands along the pond.

The Silresim Superfund Site is located directly adjacent to the site (to the west). The abutting site was fenced in, posted and appeared to be part of an operating groundwater treatment plant.

According to the USDA Web Soil Survey, the soils on the site consist of the following: 653-Udorthents, sandy and 626B-Merrimac-Urban Land complex, 0 to 8 percent slopes.

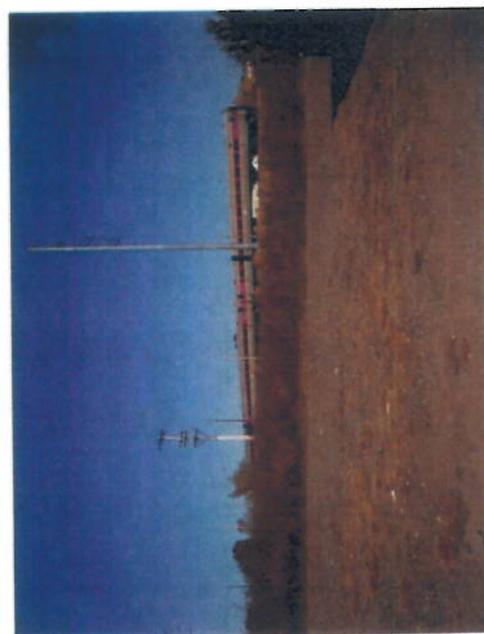
According to the Lowell Flood Insurance Rate Maps, the site is not located within the 100-year flood zone.

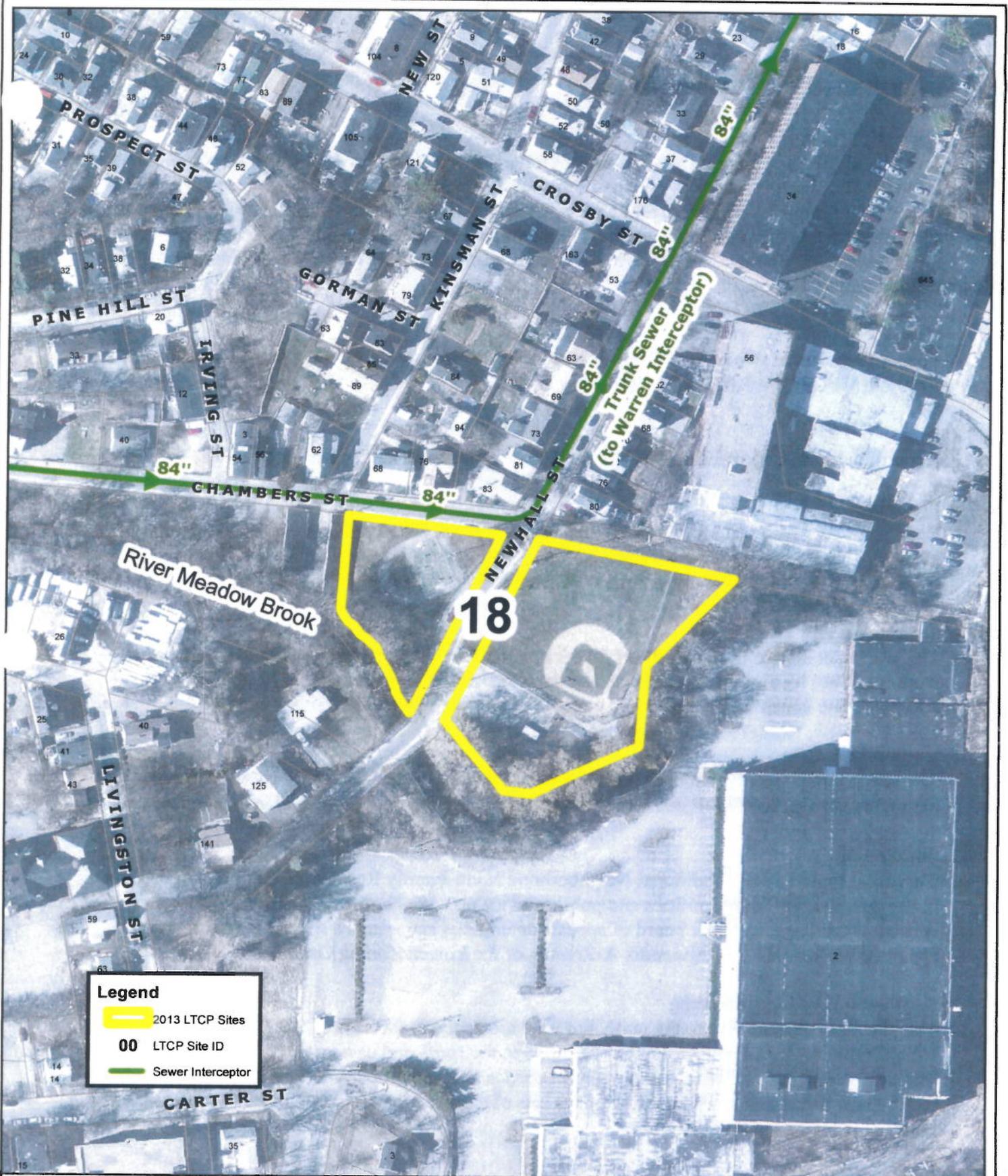
There are no Estimated Habitats or Priority Habitats of rare species within the site as indicated by the 2008 Priority and Estimated Habitat layers created by NHESP.

Historic Features

A review of the State Register of Historic Places and the Inventory of Historic and Archaeological Assets of the Commonwealth of the Massachusetts located at the Massachusetts Historical Commission did not identify any known historical structures or archaeological sites within the CSO site. The site does not appear to fall within a historic district.

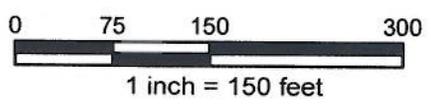
Site 17





Legend

- 2013 LTCP Sites
- 00** LTCP Site ID
- Sewer Interceptor



Lowell, MA Sewer System
Satellite Site 2013 LTCP

November, 2013

**Site
18**

**Site No. 18-Warren CSO Station
Newhall Street and Chambers Street**

Location

The site, known as Oliveria Park, is located on the north bank of River Meadow Brook in South Lowell. The site is bisected by Newhall Street at the intersection of Chambers Street. The site is bound by a vacant lot with trees to the west, a building to the east, residential houses to the north, and River Meadow Brook to the south. The site is located approximately 4,000 feet south from the Warren CSO Station. An 84-inch trunk sewer that contributes to the Warren Interceptor is located within the site.

Ownership

The site consists of two parcels bisected by Newhall Street owned by the City of Lowell. [GIS 1140-84; GIS ID 4315-85, Book 1631, Page 334]

Area

According to the City of Lowell assessor's map, the site has a land area of 1.84 acres.

Elevation

Based on City of Lowell topographic mapping, the site elevation ranges from 80 to 90 feet. The average site elevation is approximately 86 feet. The western portion of the site slopes slightly from west to east and the eastern portion of the site is relatively flat. (NAVD 88).

Site Access and Traffic

The site is accessible from Chambers Street and Newhall Street, which lead to Gorham Street. Both roads are local residential streets and are relatively narrow, but should be able to accommodate construction traffic and equipment without significant traffic delays.

Current Land Use

The site is comprised of two open space parcels (Oliveria Park) bisected by Newhall Street. The park consists of a basketball court on the west and a baseball field and a parking lot on the east.

Site Zoning

The site is zoned TMF Traditional Neighborhood Multi-Family Residential District. According to the zoning regulations, utilities and public service uses are permitted in this district as a special exception only if the board of appeals determines and grants a special permit therefor as provided in Section 11-3, Appendix A-Zoning, of the Lowell Zoning Ordinance.

Surrounding Land Use/Zoning

The site and adjacent land to the north and west are zoned in the same TMF Traditional Neighborhood Multi-Family District. The land to the south and east is zoned LI Light Industry, Manufacturing, and Storage. Residential properties abut the property to the north on both sides of Newhall Street and Kinsman Street. Two sets of storage garages abut the site to the west and a building is located east of the site.

Environment

There are wetlands along River Meadow Brook bank. The site is also within the 100-Foot Buffer Zone to Inland Bank and is within the 25-foot Riverfront Area.

According to the Lowell Flood Insurance Rate Maps, the south-eastern portion of the site that directly abuts River Meadow Brook is within the 100-year flood zone.

According to the USDA Web Soil Survey, the soils in the area consist of the following: 655-Udorthents, wet substratum and 602-Urban Land.

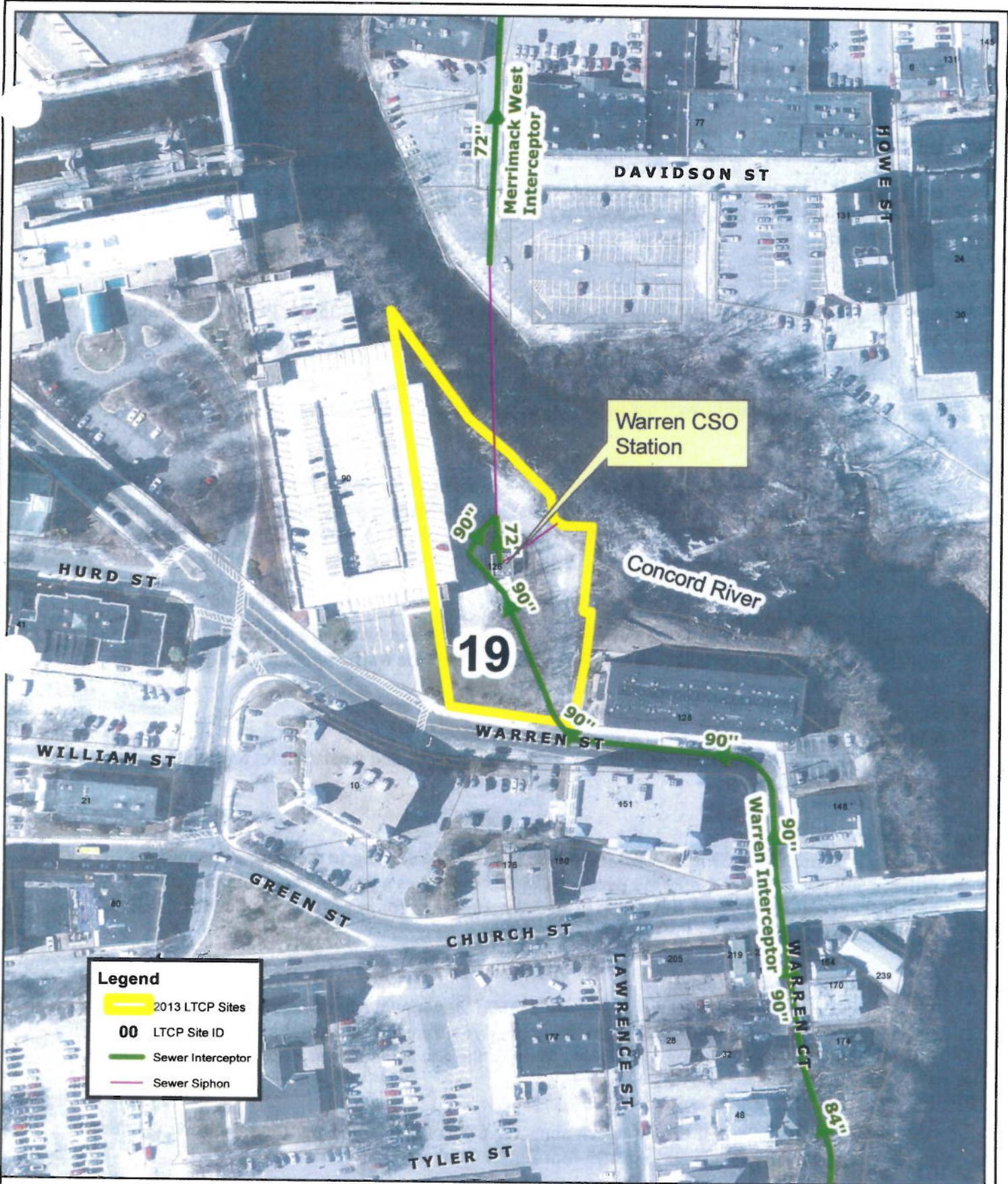
There are no Estimated Habitats or Priority Habitats of rare species within this site as indicated by the 2008 Priority and Estimated Habitat layers created by NHESP.

Historic Features

A review of the State Register of Historic Places and the Inventory of Historic and Archaeological Assets of the Commonwealth of the Massachusetts located at the Massachusetts Historical Commission did not identify any known historical structures or archaeological sites within the CSO site. The site does not appear to fall within a historic district.

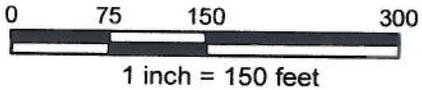
Site 18





Legend

- 2013 LTCP Sites
- 00** LTCP Site ID
- Sewer Interceptor
- Sewer Siphon



Lowell, MA Sewer System
Satellite Site 2013 LTCP

November, 2013

**Site
19**

**Site No. 19-Warren CSO Station
Warren Street**

Location

The site is located along the Concord River in the Back Central neighborhood of Lowell. The site is bounded by Warren Street to the south, a parking garage to the west, and the Concord River to the north and east. The Warren CSO Station and the Warren Interceptor are located within the site.

Ownership

The site consists of one parcel owned by the City of Lowell. [GIS 6135-90, Book 1310, Page 382].

Area

According to the City of Lowell assessor's map, the site has a land area of 1.33 acres.

Elevation

Based on City of Lowell topographic mapping the site elevation ranges from 56 to 80 feet. The average site elevation is approximately 70 feet. The site slopes slightly from Warren Street to a retaining wall which leads to the elevation where the Warren CSO station and parking lot are located. The site then slopes again from that elevation toward the river. (NAVD 88).

Site Access and Traffic

The site is accessible from the south by Warren Street. Warren Street is a moderate to heavily traveled road and should be able to accommodate construction traffic without significant traffic delays.

Current Land Use

The site includes the Warren CSO Station, a 96" outfall pipe, and a parking lot to accommodate maintenance vehicles.

Site Zoning

The site is zoned DMU Downtown Mixed-Use District. According to the zoning regulations, utilities and public service uses are permitted in this district as a special exception only if the board of appeals determines and grants a special permit therefor as provided in Section 11-3, Appendix A-Zoning, of the Lowell Zoning Ordinance.

Surrounding Land Use/Zoning

The site and all adjacent land areas comprise a DMU Downtown Mixed-Use District. Immediately to the south across Warren Street are two office buildings and a parking lot, and there is another office building to the east. West of the site is the Lower Locks Parking Garage.

Environment

There are wetlands along the bank which abuts the Concord River. A portion of the site is within the 25-foot Riverfront Area and the 100-foot Buffer Zone to Bank.

According to the USDA Web Soil Survey, the soils on the site consist of 602-Urban Land.

According to the Lowell Flood Insurance Rate Maps, the portion of the site directly along the Concord River is within the 100-year flood zone.

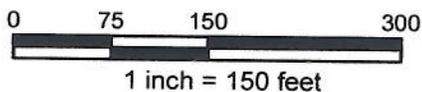
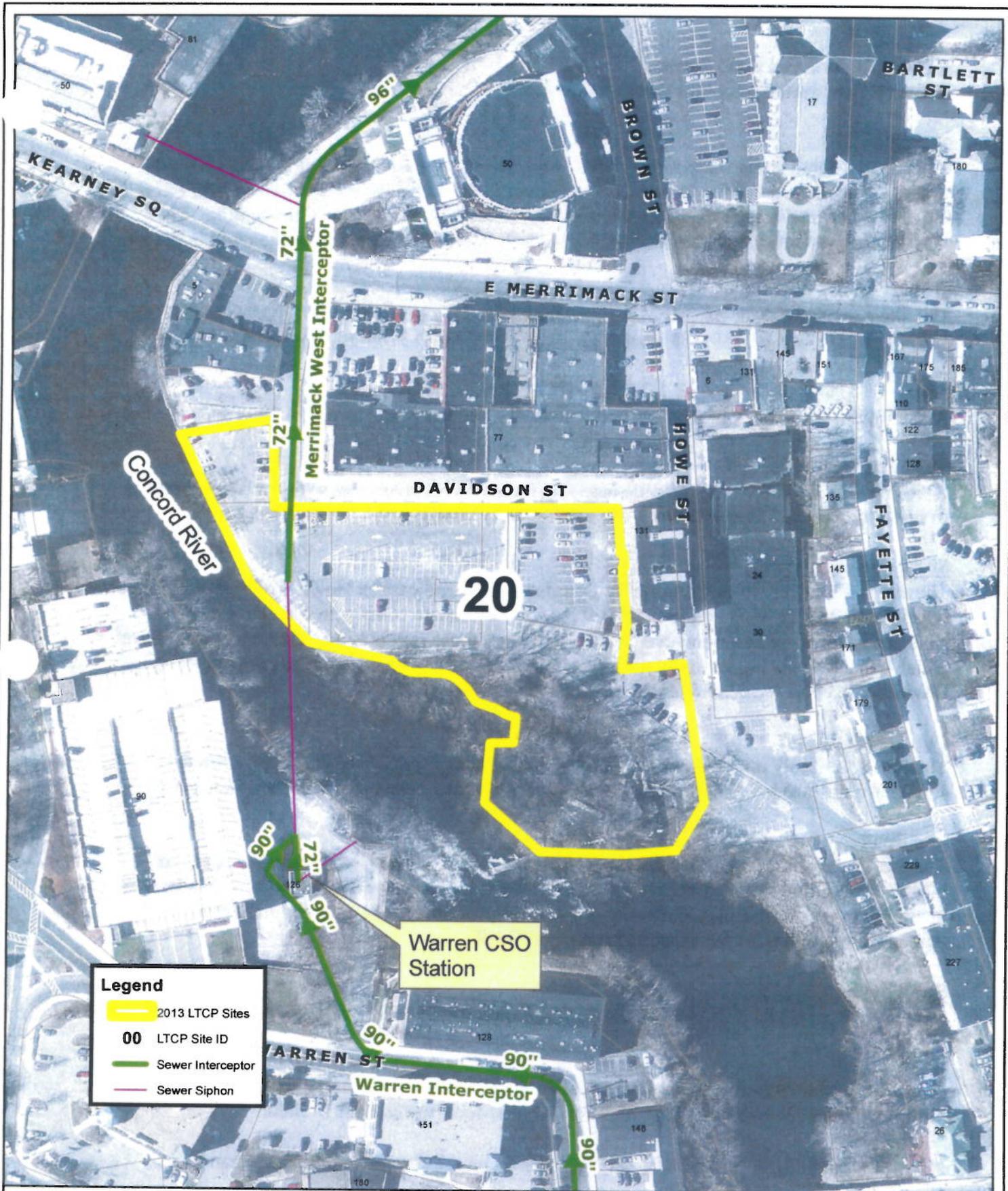
There are no Estimated Habitats or Priority Habitats of rare species within this site as indicated by the 2008 Priority and Estimated Habitat layers created by NHESP.

Historic Features

A review of the State Register of Historic Places and the Inventory of Historic and Archaeological Assets of the Commonwealth of the Massachusetts located at the Massachusetts Historical Commission did not identify any known historical features or archaeological sites within the CSO site. The site falls within the Lowell National Historical Park & Preservation District, and the Downtown Lowell Historical District.

Site 19





Lowell, MA Sewer System
 Satellite Site 2013 LTCP

November, 2013

Site
 20

**Site No. 20-Warren CSO Station
Between Davidson Street and the Concord River**

Location

The site is located along the Concord River, and directly across the river from Warren CSO Station. The site is bounded by the Concord River to the south and west and Davidson Street to the north. The site is approximately 500 feet northwest from the Warren CSO Station. The Warren Siphon Outlet Structure and the Merrimack West Interceptor are located within the site.

Ownership

The site consists of three parcels of land owned by the City of Lowell. [GIS ID 1695-45, Book 312, Page 219; GIS ID 1695-65 Book 312, Page 219; GIS ID 3100-30, Book 1185, Page 598].

Area

According to the City of Lowell assessor's map, the site has a land area of 4.24 acres.

Elevation

Based on City of Lowell topographic mapping the site is relatively flat with elevations ranging from 60 to 66 feet. The average site elevation is approximately 65 feet. (NAVD 88).

Site Access and Traffic

The site is accessible from the north by Davidson Street and east by Howe Street. Both of these roads are lightly traveled and should be able to accommodate construction traffic without significant traffic delays. However, access to both of these streets is by East Merrimack Street which has relatively heavy traffic during certain hours of the day and may experience delays. Davidson Street is paved with cobblestone pavers.

Current Land Use

The site is currently multiple parking lots serving various nearby businesses and attractions. The south eastern-most portion of the site contains "Concord Greenway" - a landscaped river walk.

Site Zoning

The site is zoned DMU Downtown Mixed-Use District. According to the zoning regulations, utilities and public service uses are permitted in these districts as a special exception only if the board of appeals determines and grants a special permit therefor as provided in Section 11-3, Appendix A-Zoning, of the Lowell Zoning Ordinance.

Surrounding Land Use

The site and all adjacent land areas are located within the DMU Downtown Mixed-Use District.

Environment

There are wetlands along the bank which abuts the Concord River and portions of the site are within both the 25-foot Riverfront Area and the 100-foot Buffer Zone to Bank.

According to the USDA Web Soil Survey, the soils on the site consist of 602-Urban Land.

According to the Lowell Flood Insurance Rate Maps, a majority of the site is located within the 100-year flood zone.

There are no Estimated Habitats or Priority Habitats of rare species within this site as indicated by the 2008 Priority and Estimated Habitat layers created by NHESP.

Historic Features

A review of the State Register of Historic Places and the Inventory of Historic and Archaeological Assets of the Commonwealth of the Massachusetts located at the Massachusetts Historical Commission did not identify any known historical features or archaeological sites within the CSO site. The site is adjacent to the Musketaquid Mills Historical site (Low.498), but does not appear to be within a historical district.

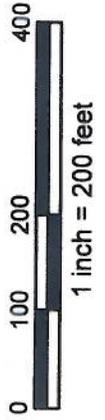
Site 20





Legend

- 2013 LTCP Sites
- 00 LTCP Site ID
- Sewer Interceptor



Lowell, MA Sewer System
 Satellite Site 2013 LTCP

**Site
 21**

November, 2013

**Site No. 21–Merrimack CSO Station
North of Stackpole Street and Corrigan Avenue**

Location

The site is located on the south bank of the Merrimack River in the Belvidere neighborhood of Lowell. The site is bounded Stackpole Street and Corrigan Avenue to the south and the Merrimack River to the north. The Merrimack CSO Station is located approximately 800 feet west of the site. The Merrimack West Interceptor is located within the site.

Ownership

The site consists of one parcel owned by the City of Lowell. [GIS ID 5470-254, Book 3471, Page 264].

Area

According to the City of Lowell assessor's map, the site has a land area of 2.25 acres.

Elevation

Based on City of Lowell topographic mapping, the site elevation ranges from 50 to 74 feet. The average site elevation is approximately 64 feet. The site grades drop steadily from Stackpole Street to a flat area occupied by the Merrimack West Interceptor. (NAVD 88).

Site Access and Traffic

The site would be accessed from Stackpole Street and Corrigan Avenue. Both are residential streets with very low traffic and should be able to accommodate construction traffic without significant delays.

Current Land Use

The site is a narrow, vegetated/wooded vacant lot along the Merrimack River.

Site Zoning

The site is zoned TTF Traditional Neighborhood Two Family Residential. According to the zoning regulations, utilities and public service uses are permitted in this district as a special exception only if the board of appeals determines and grants a special permit therefor as provided in Section 11-3, Appendix A-Zoning, of the Lowell Zoning Ordinance.

Surrounding Land Use/Zoning

The site and adjacent land to the south east and west of the site are all part of the same TTF Traditional Neighborhood Two Family Residential District. The site is bound to the north by the Merrimack River.

Environment

There are wetlands along the Merrimack River bank. The site is also within the 25-foot Riverfront Area and the 100-foot Buffer Zone to Bank.

According to the USDA Web Soil Survey, the soils on the site consist of the following: 629C-Canton-Charlton-Urban land Complex, 3 to 15 percent slopes.

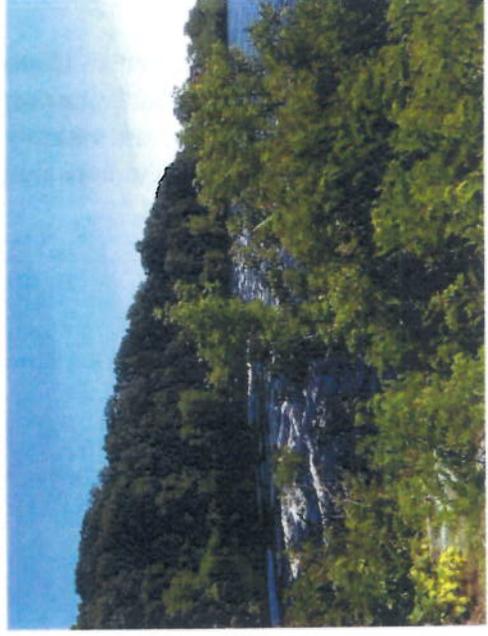
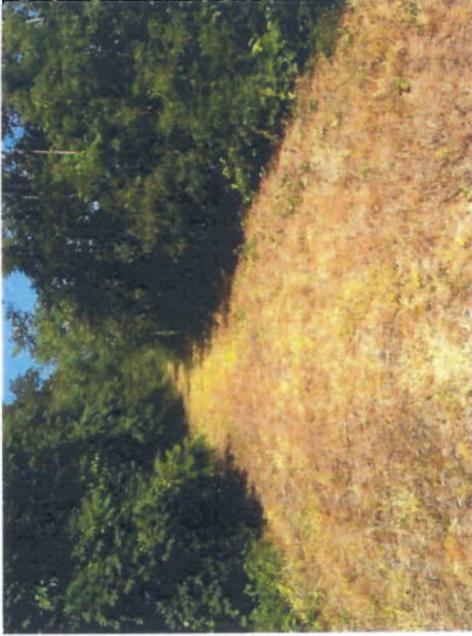
According to the Lowell Flood Insurance Rate Maps, a majority of the site is within the 100-year flood zone.

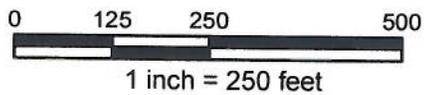
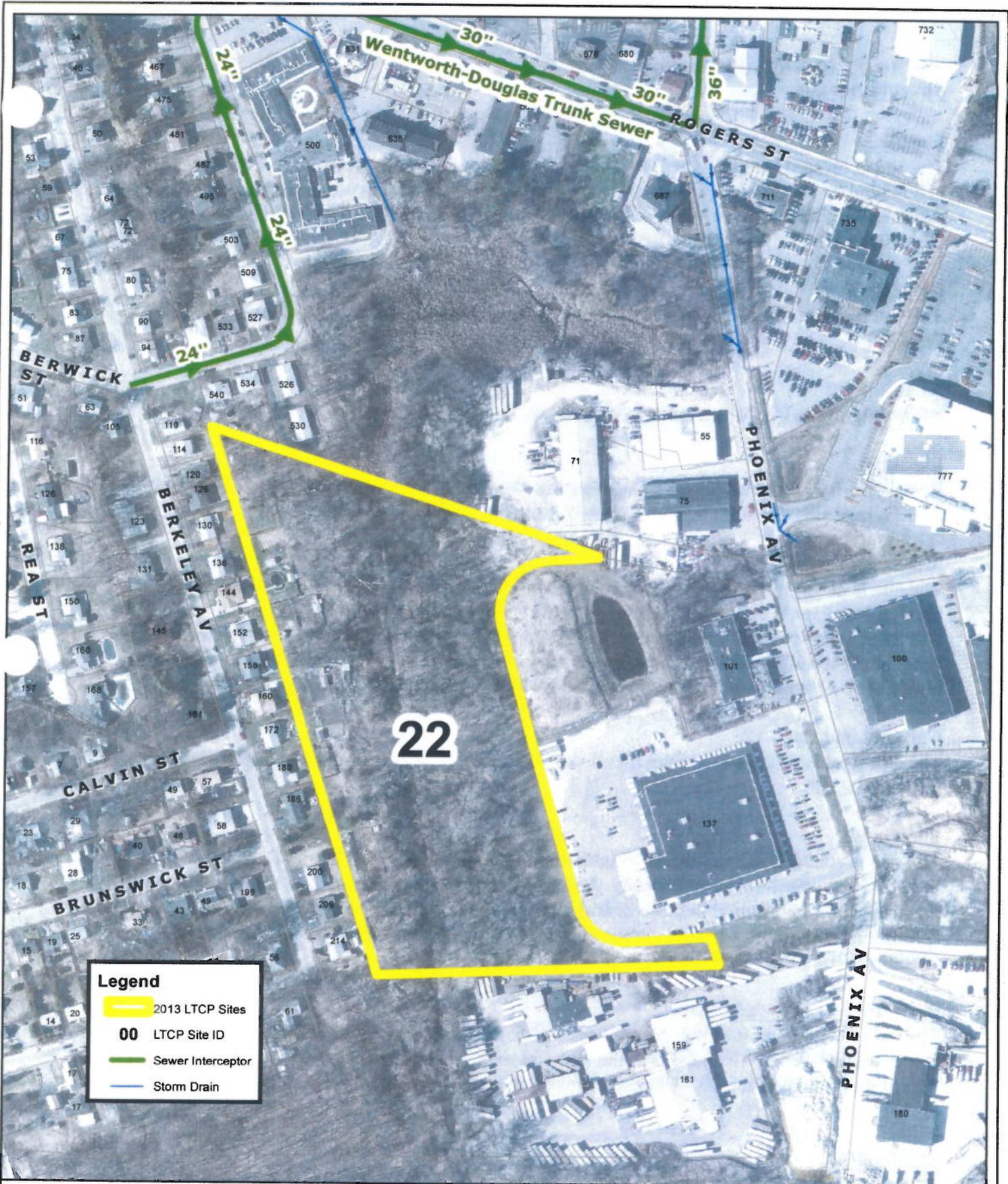
The site is located along the Merrimack River which is listed as an Estimated Habitat (WH 65) and a Priority Habitat (PH 1321) as indicated by the 2008 Priority and Estimated Habitat layers created by NHESP.

Historic Features

A review of the State Register of Historic Places and the Inventory of Historic and Archaeological Assets of the Commonwealth of the Massachusetts located at the Massachusetts Historical Commission did not identify any known historical structures or archaeological sites within the CSO site. The site does not appear to fall within a historic district.

Site 21





Lowell, MA Sewer System
Satellite Site 2013 LTCP

November, 2013

Site
22

Site No. 22-Green Infrastructure Phoenix Avenue

Location

The site is located between Phoenix Avenue and Berkeley Avenue near Rogers Street. The site is bounded by residential and commercial properties on Berkeley Avenue to the west, Wentworth Avenue and Site No. 23 to the north, industrial and commercial properties on Phoenix Avenue to the east, and the Lowell Post Office to the south.

Ownership

The site consists of one parcel owned by the City of Lowell. [GIS ID 0540-170.1, Book 5825, Page 90]

Area

According to the City of Lowell assessor's map, the site has a land area of 10.13 acres.

Elevation

Based on City of Lowell topographic mapping, the site elevation ranges from 124 to 146 feet. The average site elevation is approximately 130 feet. (NAVD 88).

Site Access and Traffic

The site is accessible from an access road located on Phoenix Avenue or the parking lot of a nursing home on Wentworth Avenue. Phoenix Avenue appears to experience moderate traffic with many nearby commercial and industrial buildings. Wentworth Avenue is a residential road with minimal traffic. Both of these streets are accessed by Rogers Street, which has relatively high traffic volume and may experience delays during peak traffic periods of the day.

Current Land Use

The site is a heavily wooded lot with no visible structures. There is an open stream running through the site.

Site Zoning

The site is zoned TSF Traditional Neighborhood Single Family Residential District and LI Light Industry, Manufacturing and Storage. According to the zoning regulations, utilities and public service uses are permitted in these districts as a special exception only if the board of appeals determines and grants a special permit therefor as provided in Section 31-15, Appendix A-Zoning, of the Lowell Zoning Code.

Surrounding Land Use/Zoning

The parcels to the west of the site are zoned TSF Traditional Neighborhood Single Family Residential District. The parcels to the east and south of the site are zoned LI Light Industry, Manufacturing and Storage. The parcels to the north of the site are zoned RR Regional Retail District.

Environment

Wetlands were observed on the site, however, the site is not abutting any recognized water body. The site is not located within the 100-foot Buffer Zone or the 25-foot Riverfront Area.

According to the USDA Web Soil Survey, the soils in the area consist of the following: 6A-Scarboro mucky fine sandy loam, 0 to 3 percent slopes, 603-Urban land, wet substratum, 602-Urban land, and 626B-Merrimac-Urban land complex, 0 to 8 percent slopes.

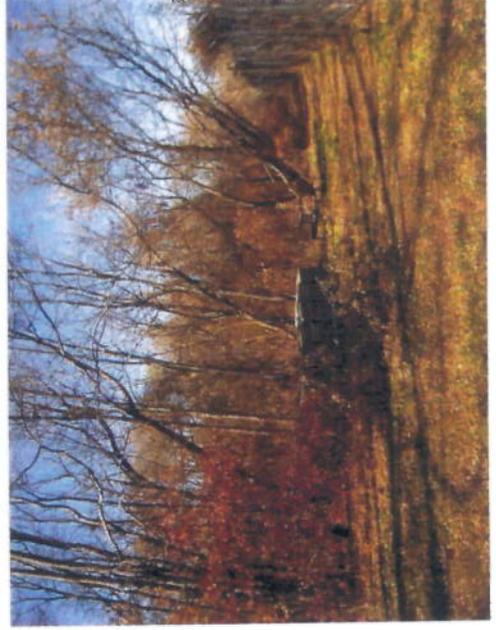
According to the Lowell Flood Insurance Rate Maps, a majority of the site is within the 100-year flood zone.

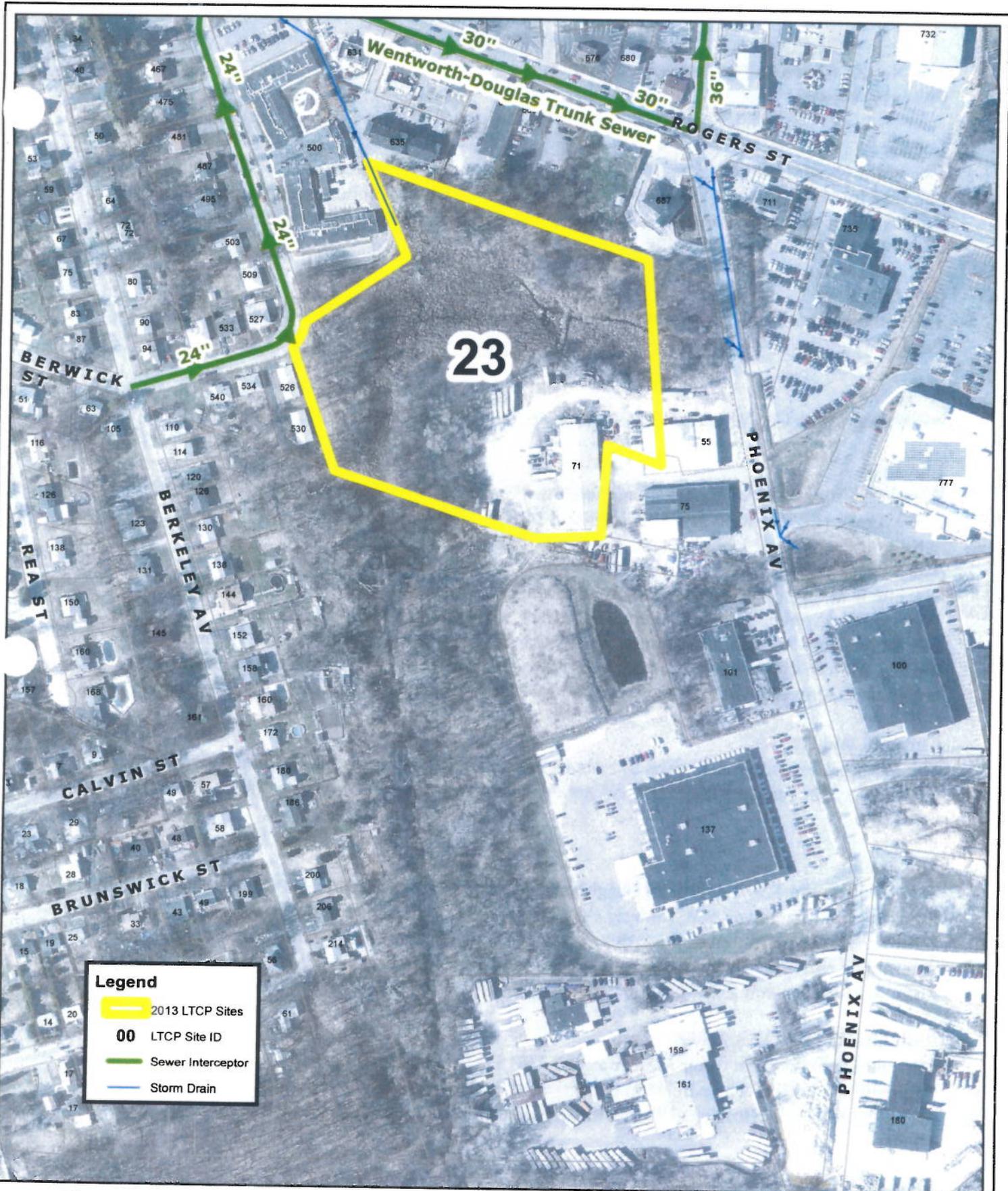
There are no Estimated Habitats or Priority Habitats of rare species within this site as indicated by the 2008 Priority and Estimated Habitat layers created by NHESP.

Historic Features

A review of the State Register of Historic Places and the Inventory of Historic and Archaeological Assets of the Commonwealth of the Massachusetts located at the Massachusetts Historical Commission did not identify any known historical structures or archaeological sites within the CSO site. The site does not appear to fall within a historic district.

Site 22





Legend

- 2013 LTCP Sites
- 00** LTCP Site ID
- Sewer Interceptor
- Storm Drain



Lowell, MA Sewer System
Satellite Site 2013 LTCP

November, 2013

**Site
23**

Site No. 23-Green Infrastructure Phoenix Avenue

Location

The site is located between Phoenix Avenue and Berkeley near Rogers Street. The site is bounded by residential and commercial properties on Berkeley Avenue, Wentworth Avenue and Rogers Street to the west and north, industrial and commercial properties on Phoenix Avenue to the east, and wetlands to the south.

Ownership

The site consists of one parcel owned by Phoenix Avenue LLC. [GIS ID 4635-89, Book 22035, Page 134]

Area

According to the City of Lowell assessor's map, the site has a land area of 7.50 acres.

Elevation

Based on City of Lowell topographic mapping, the site elevation ranges from 122 to 138 feet. The average site elevation is approximately 124 feet. (NAVD 88).

Site Access and Traffic

The site is accessible from an access road located on Phoenix Avenue or a nursing home on Wentworth Avenue. Phoenix Avenue appears to experience moderate traffic with many nearby commercial and industrial buildings. Wentworth Avenue is a residential road with minimal traffic. Both of these streets are accessed by Rogers Street which has relatively high traffic volume and may experience delays during higher traffic periods of the day.

Current Land Use

The site has been previously used to store equipment and also has an old building/warehouse for a business. The majority of this parcel, on the north and west, has a running stream and wetlands.

Site Zoning

The site is zoned TSF Traditional Neighborhood Single Family Residential District and LI Light Industry, Manufacturing and Storage. According to the zoning regulations, utilities and public service uses are permitted in these districts as a special exception only if the board of appeals determines and grants a special permit therefor as provided in Section 31-15, Appendix A-Zoning, of the Lowell Zoning Code.

Surrounding Land Use/Zoning

The parcels to the west of the site are zoned TSF Traditional Neighborhood Single Family Residential District. The parcels to the east and south of the site are zoned LI Light Industry, Manufacturing and Storage. The parcels to the north of the site are zoned RR Regional Retail District.

Environment

Wetlands were observed on the site, however the site is not abutting any recognized water body. The site is not located within the 100-foot Buffer Zone or the 25-foot Riverfront Area.

According to the USDA Web Soil Survey, the soils in the area consist of the following: 6A-Scarboro mucky fine sandy loam, 0 to 3 percent slopes, 603-Urban land, wet substratum, 602-Urban land, and 626B-Merrimac-Urban land complex, 0 to 8 percent slopes.

According to the Lowell Flood Insurance Rate Maps, a majority of the site is within the 100-year flood zone.

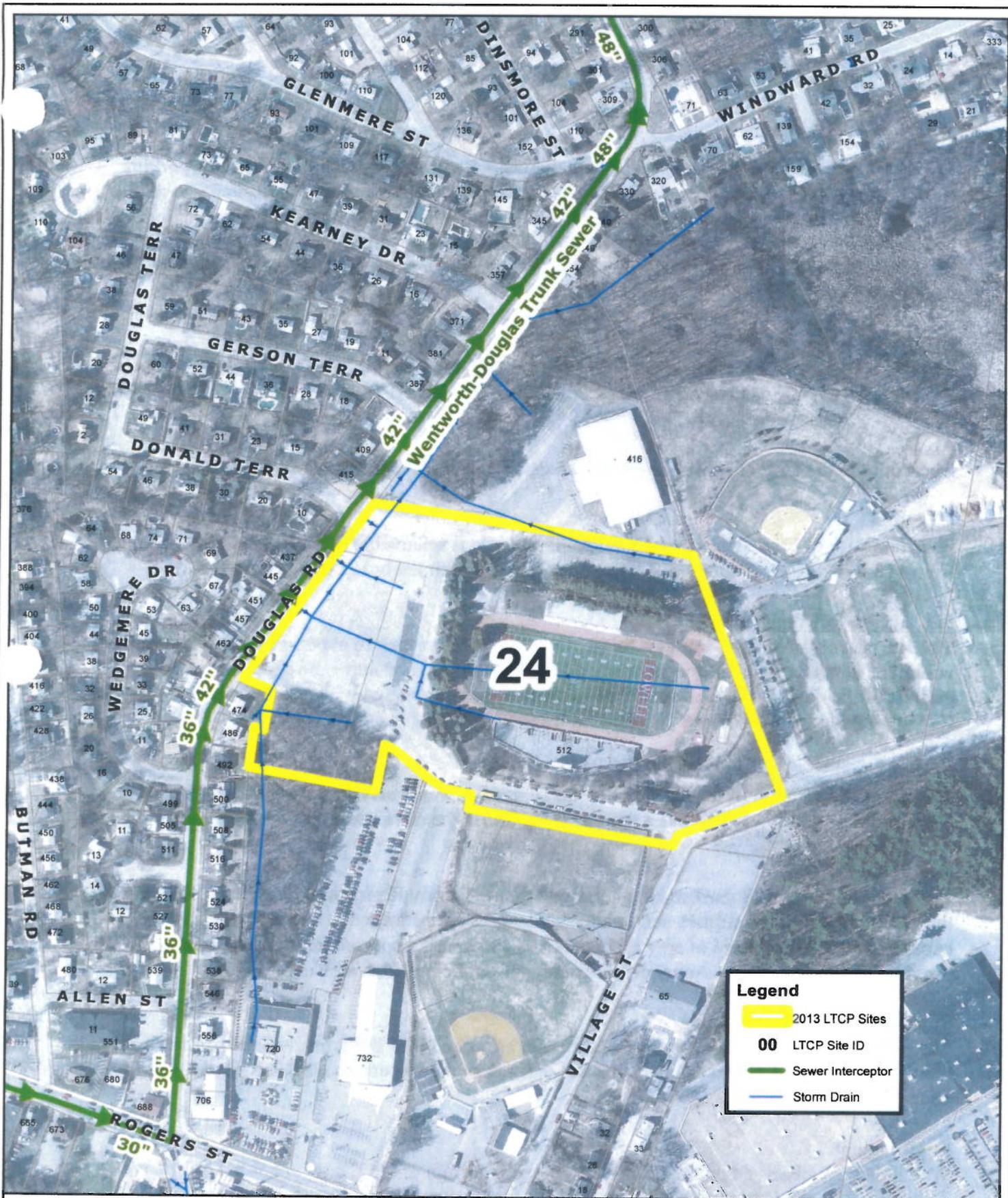
There are no Estimated Habitats or Priority Habitats of rare species within this site as indicated by the 2008 Priority and Estimated Habitat layers created by NHESP.

Historic Features

A review of the State Register of Historic Places and the Inventory of Historic and Archaeological Assets of the Commonwealth of the Massachusetts located at the Massachusetts Historical Commission did not identify any known historical structures or archaeological sites within the CSO site. The site does not appear to fall within a historic district.

Site 23





Legend

- 2013 LTCP Sites
- 00** LTCP Site ID
- Sewer Interceptor
- Storm Drain

Lowell, MA Sewer System
 Satellite Site 2013 LTCP

**Site
 24**

November, 2013

Site No. 24-Barasford CSO Station Douglas Road

Location

The site is located along Douglas Road and includes Cawley Stadium Complex and its parking lots. The site is bounded by the Janas Ice Rink to the north, Douglas Road and some residential properties to the west, commercial properties on Rogers Street to the south, and Lowell High School athletic fields to the west. The Barasford CSO Station is located approximately 5,000 feet south of the Barasford CSO Station. The Wentworth-Douglas Trunk sewer runs adjacent to the site on Douglas Road.

Ownership

The site consists of three parcels; all owned by the City of Lowell. [GIS ID 1840-438, Book 7471, Page 349; GIS ID 1840-392, Book 2091, Page 58; GIS ID 1840-424, Book 8268, Page 9]

Area

According to the City of Lowell assessor's map, the site has a land area of 15.06 acres.

Elevation

Based on City of Lowell topographic mapping, the site is relatively flat with elevations ranging from 118 to 124 feet. The average site elevation is approximately 121 feet. (NAVD 88).

Site Access and Traffic

The site is accessible from Douglas Road. Douglas Road appears to experience moderate traffic volumes. Douglas Road may experience relatively high traffic volume during peak traffic periods of the day. Work on this site would need to be coordinated with athletic events at Cawley Stadium Complex and the adjacent Lowell High School athletic fields.

Current Land Use

The site is the location of the Cawley Stadium Complex which serves as a football field, and track and field center. It also has a large parking lot for the complex on the west side.

Site Zoning

The site is zoned SSF Suburban Neighborhood Single Family Residential District. According to the zoning regulations, utilities and public service uses are permitted in these districts as a special exception only if the board of appeals determines and grants a special permit therefor as provided in Section 31-15, Appendix A-Zoning, of the Lowell Zoning Code.

Surrounding Land Use/Zoning

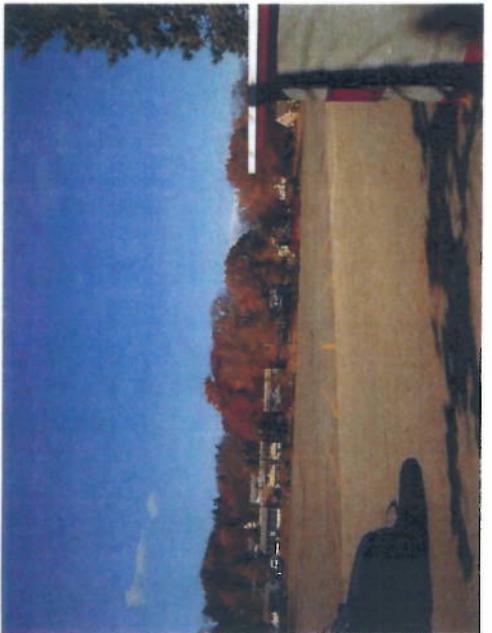
The parcels to the north, east and west of the site are zoned SSF Suburban Neighborhood Single Family Residential District. The parcels to the south of the site are zoned RR Regional Retail District.

Environment

Wetlands were observed on the south-western-most portion of the site, which is a Trull Brook Tributary. The site is not located within the 100-foot Buffer Zone or the 25-foot Riverfront Area.

According to the USDA Web Soil Survey, the soils in the area consist of 656-Udorthents, Urban land complex.

Site 24



According to the Lowell Flood Insurance Rate Maps, the site is not within the 100-year flood zone.

There are no Estimated Habitats or Priority Habitats of rare species within this site as indicated by the 2008 Priority and Estimated Habitat layers created by NHESP.

Historic Features

A review of the State Register of Historic Places and the Inventory of Historic and Archaeological Assets of the Commonwealth of the Massachusetts located at the Massachusetts Historical Commission did not identify any known historical structures or archaeological sites within the CSO site. The site does not appear to fall within a historic district.